

F1 - Preparing for Science

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- 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.	Season	The year is divided into 4 parts and these are called seasons.	Plant	A living thing, trees, flowers, grass are all plants.	Link with all other areas of learning: - communication and language. - physical development. - personal, social and emotional development. - literacy. - mathematics. - Expressive arts.
	Autumn	The season after Summer and before Winter.	Science question words.	What if... I wonder... How...	
	Winter	The season after Autumn and before Spring.	Body parts	Head, hands, feet, face, nose, mouth, eyes, chin, ears, tummy.	
	Spring	The season after Winter and before Summer.	Animal names	Dog, cat, cow, pig, horse, goat, tiger, giraffe, lion, zebra.....	
	Summer	The season after Spring and before Autumn.	Comparative language	Big/small, soft/hard, long/short, loud/quiet.	
	Weather	Rain, sun, snow, cloudy, cold, warm, hot.	Descriptive language	Fluffy, sticky, smelly, bumpy....	

Preparing for...	Key Knowledge	Disciplinary Knowledge / Skills
1. The senses	Children will explore the senses by considering the sights and sounds around them. They will be able to name key sounds such as a 'siren'. They will use their senses when exploring materials and their environment.	To explore the world around them, engaging their senses.
2.Environment	Children will learn about their immediate environment and make observations about it, such as noticing the weather—splashing in puddles, spotting rainbows and building snowmen. They will explore plants as they take walks around school, noticing the sounds and smells. They ask questions about their world and community, stimulated through their experiences . They will	To make observations of the natural world, noticing patterns and changes over time.
3.Working scientifically	Children are encouraged to play and explore and 'have a go' across all provision. They are encouraged to ask questions, notice patterns and changes. They are encouraged to verbalise their thinking and supported with good models of language and key vocabulary.	To ask questions.
4. Seasons	Children will explore the seasons through walks around school. They will make observations about the changes they notice and link this to stories and books they are reading. They collect seasonal items and are encouraged to ask questions about them and describe them. They link their knowledge of seasons to other areas of learning such as growing and plants.	To make observations of the natural world, noticing patterns and changes over time.
5. Humans	Children will learn about their bodies by thinking about who they are, what they look like and how they are similar and different to each other. They will learn about the people who are important to them and their families. They consider what we need to survive, our likes and dislikes and make simple items of food to share.	To name common body parts and make simple comparisons.
6.Animals	Children will be making observations of the animals in their environment, naming different common animals and considering where they live. They will look at what animal might eat and what Dinosaurs ate in their themed learning. They will think about size, shape and movement of animals and consider the noises they make.	To make observations of their environment.
7. Materials	Children will manipulate materials such as playdough. They will notice how some materials feel different as well as look different e.g. foam, toothpaste, oil. They will make observations about materials such as 'it is stretchy' 'it is soft'. They will notice some similarities between materials.	To explore materials in different ways.

Themes		Diversity in the Curriculum
<i>Working Scientifically</i>	Children will make observations, noticing patterns and changes in the world around them; they will widen their vocabulary of the natural world.	In each unit, children to consider similarities and differences: E.g. how are we different? How are animals different? What makes us the same? Encourage children to use their own knowledge of people and places they've been, e.g. on holiday, when discussing differences in weather, climate, animals etc.
<i>Oracy</i>	Children learn to describe in simple terms what they can see, hear, smell; they learn to ask simple questions about their environment or when handling objects.	

Outcome	Character Traits	Stickability	WOW
The children's interests will influence provision.	Curiosity	Memorable learning experiences—doing and seeing in action.	Hatching butterflies, farm visits, seasonal walks, pet talks with Harper,.

F2 - Preparing for Science

Curriculum Objectives	Vocabulary—deepen F1 vocabulary				Links Across the Curriculum
- 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.	Season	The year is divided into 4 parts and these are called seasons, each with their own weather.	Plant	A living thing, trees, flowers, grass are all plants. Some plants have flowers, some don't.	Looking ahead: Soil is a key words in KS1 geography - children to have planted in the soil and be able to identify the soil in their outdoor area. Seasonal Change—Y1—children need to have explored weather at different times of year and made observations of their immediate environment, noting changes across the year. Humans and Other Animals—children need to have had experience of exploring animals so they can name some common farm, domestic and wild animals. They need to be familiar with basic body parts. Materials—children need to have understood that things are made of different materials and had chance to explore a range of textures so they have some descriptive vocabulary to support them when investigating materials in KS1. Forest School links—developing vocabulary across a range of topics.
	Autumn	The season after Summer and before Winter. Leaves change colour and fall, it gets colder.	Science question words.	What if... I wonder... How... Why...	
	Winter	The season after Autumn and before Spring. Frost and snow may occur because temperatures drop.	Body parts	Head, hands, feet, face, nose, mouth, eyes, chin, ears, tummy, knees, hips.	
	Spring	The season after Winter and before Summer. The weather warms up, plants start to grow and animals are born.	Animal names	Dog, cat, cow, pig, horse, goat, tiger, giraffe, lion, zebra..... Wider range as encountered.	
	Summer	The season after Spring and before Autumn. Food ripens, it warms up, people spend more time outside as the nights are lighter.	Comparative language	Big/small, soft/hard, long/short, loud/quiet. Wider range as encountered.	
	Weather	Rain, sun, snow, hail, fog, cloudy, cold, warm, hot.	Descriptive language	Fluffy, sticky, smelly, bumpy....Wider range as encountered.	

Preparing for...	Key Knowledge	Disciplinary Knowledge / Skills
1. Growing Ready steady grow	Children must leave EYFS having experience of planting and looking after plants. Children will have planted different flowers and vegetables themselves and will have watered them. Children will be able to say that plants need the sunlight and warmth otherwise they will not grow. They will read a range of text such as The Enormous Turnip and Handa's Surprise, using these to initiate discussions around fruit, vegetable, likes and dislikes and growing conditions.	To explore plants in a range of ways, including first hand experience of planting.
2. Plants Ready steady grow	Children (through their Forest School sessions) will name basic trees and plants. They will make observations of plants and understand they need water to survive. They will link to texts such as 'Jack and the Beanstalk' and use this to stimulate simple 'what if'... questions about plants.	To engage with the natural world in a variety of ways.
3. Materials	Children will study The Three Little Pigs as a topic and learn the story through their T4W. They will explore the three different materials and understand why the brick house was the strongest and the best. The children will be able to touch and build using all three materials and explore their properties for themselves. Children will also explore using magnets and discover what is magnetic and what is not in their classroom / school environment.	To explore materials through the senses and simple investigations.
4. Animals	Children will make observations of animals explaining why things happen and changes that occur. During their 'On the Beach' topic, children will learn about rockpools and how they are habitats for particular animals and be able to name some of the creatures found there. They will learn basic features of a suitable habitat e.g. water, the rocks protecting them from animals who might eat them. They will explore animals further in a range of books they read such as 'Mr Gumpy's outing, setting up simple experiments that link to materials and floating, and 'Farmer Duck' exploring the roles and responsibilities illustrated in the story.	To make observations about the natural world; to set up simple investigations.
5. Environment	Children will learn about their responsibility to look after the environment to protect animals and the earth. During their 'On the Beach' topic, children will think about litter on the beaches specifically and link that to their responsibility to recycle in the classroom and at home. Children will notice the changes in the seasons as they occur, naming simple changes such as the weather changing and the nights getting darker.	To make observations about the natural world, looking for patterns and observing change over time.
6. Working scientifically	Children will be encouraged to ask questions about why things happen and how they occur. Throughout the EYFS curriculum, children will be given the chance to perform simple investigations and explore 'What happens if...' Adults facilitate deeper thinking through questioning, prompts and 'I wonder...' statements and support children to draw conclusions from what they have done. For example, children will explore using water and will compare capacity, or find out what might float and sink and why (preparing for properties of materials and working scientifically). They might do investigations such as opening a mechanical toy to see how it works. They will look for patterns and change.	To ask questions about their learning, showing wonder and fascination.
7. The Senses	Children will learn to use their senses, feeling dough or listening to sounds in the environment, such as sirens or farm animals.	To engage senses when exploring, identifying familiar sounds, sights and smells.

Themes		Diversity in the Curriculum
Working Scientifically	Children will make observations, noticing patterns and changes in the world around them; they will carry out simple investigations; they will widen their	Children understand that scientists all look different - male/ female/of different nationalities. They understand that they all need to work together when investigating and begin to understand the different roles they might take.
Oracy	Children learn to ask questions as they engage with the world around them; they make comparisons based on observations; they widen their descriptive vocabulary through exploration.	

Outcome	Character Traits	Stickability	WOW
The children's interests will influence provision.	Curiosity	Memorable learning experiences—doing and seeing in action.	Growing tadpoles, hatching chicks, growing own food, visits from vets, doctors, seasonal walks.

Y1 - Science Everyday Materials (*Childhood—History*)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- distinguish between an object and the material from which it is made - identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock - describe the simple physical properties of a variety of everyday materials - compare and group together a variety of everyday materials on the basis of their simple physical properties.	Material	The matter from which something is made.	Waterproof	Will not let water through.	History Unit on Childhood: The suitability of materials to make different types of toys. School festivals: the suitability for different materials to make bunting. Build on this unit in Y2
	Opaque	Not see-through.	Absorbent	Soaks up liquids.	
	Transparent	Can be seen through.	Investigate	To find something out in different ways.	
	Rough	An uneven surface.	Describe	To say what an object looks, smells, acts and feels like.	
	Smooth	An even surface.	flexible	Can be pulled into different shapes without breaking.	
	properties	Characteristics that describe	observe	To watch and see what happens.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. Where do materials come from? (E1/2)	Children learn that some materials are natural and found in the ground or come from an animal or plant. They learn the names of some of these materials e.g. wool, wood. Children learn that some materials are made by humans using natural materials e.g. plastic, paper.	To observe and compare different materials—natural and manmade. Equipment: hand lens or digital microscopes when observing. Recording outcome: matching exercise.
2.What's it made of? (E3)	Children explore a range of natural and manmade materials such as glass, stone, brick, paper, wool and wood and learn how to describe them. They widen their knowledge of characteristics of materials by using new challenging vocabulary e.g. bendy, stiff, waterproof, opaque, transparent, translucent and hard and their opposites.	To observe closely and compare different materials, describing their characteristics. Equipment: hand lens or digital microscopes; hoops for manual sorting. Recording outcome: sorting and grouping tables.
3. Can you describe the properties of different materials? (D1/2)	Children learn how to name materials and describe their properties after handling them. They sort them into groups and learn that materials can be in more than one group.	To identify and classify different materials. Equipment: hand lens or digital microscope when observing; water spray bottle to test for waterproof; hoops for sorting manually. Recording outcome: sentence stems that link property to material; venn diagrams.
4. Can we carry out tests to compare materials? (waterproof/opacity) D3	Children understand that we can carry out simple investigations to test whether materials are waterproof and transparent, soft and stretchy, hard and opaque or shiny and hard. They know how to record information in a Venn diagram.	To perform simple tests on materials. Equipment: water spray bottle to test for waterproof; hoops for sorting manually. Recording outcome: sentence stems that link property to material; venn diagrams.
5. Which is the best material for bunting? (I Step 1/2)	Children learn that products need particular properties e.g. bunting is waterproof and bendy. They carry out investigations and record results on a Venn diagram. They make predictions on the best material using their results.	To ask simple questions that can be answered in different ways; to begin to make more formal predictions to inform further investigations. Equipment: spray bottle to test if materials are waterproof. Recording outcome: Venn diagram to interpret and support predictions.
6. Which material is best for bunting for our festival? (I Step 3)	Children learn how to carry out investigations on materials. They use results from previous investigations to make the bunting out of the different materials tested. Children learn to observe over time and wait few days then observe changes.	To observe closely, using simple equipment. Equipment: tablets to take photos of changes for comparison over time.
7. Which material is best for bunting for our festival? (I Step 4)	Children learn that materials differ and that some are more suitable than others due to their properties. They can identify changes and say why they have happened and will be able to summarise results, suggesting the best material for bunting.	To use their observations and ideas to suggest answers to questions. Recording outcome: tables note down observations so that comparisons can be easily made.
8. Assess and Review	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum
<i>Working Scientifically</i>	Children learn to compare materials, carry out simple tests and make observations over time. Key data recording outcome: Venn Diagrams and tables.	Explore how people across the world make toys and products out of different materials. Nzambi Matee—creates recycled bricks for building out of plastic and sand. Re-using waste.
<i>Materials</i>	Children learn that the world around us is full of different types of materials that are suited to their use.	

Outcome	Character Traits	Stickability	WOW
Use knowledge gleaned from the bunting investigation to make bunting for Diwali festival/Christmas.	Curiosity	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts.	Use the forest School area to gather natural material for display/investigation at the start of the topic. Bring materials in too.

Y1 - Science Seasonal Changes (Bright Light, Big City- Geography)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- observe changes across the four seasons - observe and describe weather associated with the seasons and how day length varies.	season	One of 4 periods in the year including spring, summer, autumn winter.	meteorologist	A scientist who collects wind speed, precipitation and temperature to forecast.	Links to Forest Schools—bug hunts, leaf identification, observing. Links with Earth & space in Y5.
	beauford scale	A scale used to determine strength of wind.	migrate	When an animal travels to different place in a given season.	
	Blossom	A flower or part of a flower that can turn into fruit.	hibernate	When an animals is dormant in the winter months.	
	buds	A part of a tree that will form a new leaf.	weather	What the air outside it like in one place at one time.	
	deciduous	A tree that sheds its leaves in Autumn and grows new ones in Spring.	unit	A measurement e.g. degrees Celsius, millimetres,	
	evergreen	A tree that loses and regrows leaves throughout the year.	bar chart	A chart that uses blocks to show different amounts.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What are seasons? What will happen as Winter turns to Spring? (Intro/E1.)	Build on children's current knowledge about seasons and explore the current season (winter into Spring) through walks around the area. They understand what a season is, that there are four seasons and that they are each different.	To observe changes across the seasons. Equipment: tablets to take photos of observations. Recording outcome: make simple predictions about seasonal change.
2. Why do some trees lose their leaves? (E2/3)	Children learn that trees some trees lose their leaves in winter, others regrow new leaves throughout the year. They recognize that buds show signs of new growth. They can plot seasonal change across a deciduous tree (apple) .	To observe changes and use this information to answer questions. Equipment: hand lens to observe closely. Recording outcome: observational drawings; lifecycle of an apple tree.
3. What happens to animals in different seasons? (E4)	Children learn that animals respond to seasons. Most have young in Spring, their young grow in Summer, they collect food and prepare for winter in Autumn, in Autumn they hibernate, migrate, grow fur to protect themselves from the cold.	To use their observations and ideas to suggest answers to questions. Recording outcome: seasonal lifecycles.
4.What is weather? (E5 Link with D6 Weather forecasting)	Children learn there are different types of weather that can vary across seasons and some are more common in certain seasons. They observe the weather today and understand that it can change across a day.	To make observations of weather over time. Equipment: tablets to look at weather forecasts. Recording outcome: simple weather charts.
5. Why does it get darker in Winter? (D1)	Children understand that the positions of the earth makes changes in darkness and day length. They learn that daytime in Winter is shorter because the Northern Hemisphere is further from the sun, in Summer it is longer because it is closer.	To observe changes and understand why days are longer in Summer and shorter in winter. Recording Outcome: Diagrams and cycles that show day length.
6. . How to stay safe in the sun. (D2)	Children learn about the sun in Summer and that the sun's rays can be harmful and that they need to protect their eyes and skin from the sun.	To perform simple tests and understand safety in the sun. Equipment: UV beads, tablets to photograph observations. Recording Outcome: simple observations.
7. Investigating wind. (D3a)	Children learn that weather can be measured and gathered (data). They learn about the Beauford Scale as a way to measure wind and make a simple wind -sock to observe and measure the wind over a period of 5 days.	To gather and record data to answer questions; to observe closely using simple equipment. Equipment: anemometer, windsock. Recording Outcome: simple table of wind measures.
8. Investigating temperature. (D4a)	Children learn that temperature can be measured and gathered (data) using thermometers. They learn about degrees Celsius as a way to measure temperature and use a thermometer to measure temperature over a period of 5 days.	To gather and record data to answer questions. Equipment: thermometers.
9. Investigating precipitation (D5)	Children learn that precipitation is another word for rain and that too can be measured using a rain gauge. Children make a rain gauge and use it to measure precipitation over 5 consecutive days.	Gather and record data to answer questions. To observe closely using simple equipment. Equipment: rain gauges. Recording Outcome: simple tables of rain measures over time.
10. Review and Assess.	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum
Working Scientifically	Children perform simple tests and investigations to gather data about weather. Key data recording outcome: simple tables of measures over time; seasonal lifecycles.	Learn how different parts of the world experience different weather at different times of the year.
Seasonal Change	Children identify and describe the four seasons, understanding differences between each in terms of weather and other observable features.	

Outcome	Character Traits	Stickability	WOW
Children plot their weather observations through journals/diaries which they then use to make a forecast about the coming week.	Curious	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts.	Link to Forest School—use the area for exploration of observable change and also to gather items for a sharing table.

Year 1 - Science Human Senses (Childhood—History)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- Identify, name and draw the parts of the human body. - To know which part of the human body is associated with which sense.	Animal	A living thing that grows, feeds, gets rid of waste and has babies.	Venn diagram	A diagram that shows relationships with overlapping circles.	History Unit on Childhood: growing and nutrition in the past. Links to No Outsiders: Max the Champion, showing how our bodies work in different ways. Art Link, Funny Faces and fabulous features : Children make observations of facial features. Builds on 'Human survival' in Y2.
	prediction	A good guess about what you think might happen.	Limb	An arm, leg, wing or flipper	
	human	A mammal with 4 limbs that	unique	All different and special	
	Compare	To look at 2 or more things closely to see what is the same/different.	mammal	A warm-blooded creature that gives birth to its babies.	
	Investigation	Studying a problem to find an answer—predicting,, observing, recording, results.	Body parts	Parts of the body such as chin, face, fore-arm, thigh etc.	
	diagram	A drawing with labels that shows parts of something.	senses	Touch, smell, see, hear	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What am I made of? (E1)	Children learn the names of parts of the body and other key vocabulary, including what makes humans and animals different. They draw round and label a body with these parts. They learn that humans are the same in that they have the same body parts. They learn that humans are living things and belong to a group of animals called mammals.	To identify and classify body parts. Recording outcome: labelled diagrams.
2. How many? (E2)	Children investigate patterns in the number of body parts we have, e.g. 2 eyes, 2 ears etc, 10 fingers and toes.	To use their observations to suggest answers to questions. Recording outcome: simple table of body parts; conclusions drawn using the table; encourage questioning following on from the data.
3.How are we different? (E3)	Children learn that we are all unique through observations of observe their facial features and compare them to that of a partner. They record results on a venn diagram and understand that we are all unique.	To gather and record data. Recording outcome: revisiting venn diagrams to record differences and similarities between each other.
5. Functions of body parts. (D1)	Children explore the functions of key parts of the body, referring to earlier outlines and diagrams. They investigate the functions of eyes, ears etc in terms of allowing us to sense.	To use observations and ideas to suggest answers to questions. Recording outcome: completing simple tables when investigating the senses.
Why do we need senses? (D2/3)	Children learn about the dangers that are presented through sensory loss and the tools that help people with sensory loss function e.g. visual, hearing impairment tools.	To ask simple questions.
6. How do my senses help me? (D4)	Children learn about the touch sense through a series of investigations.	To perform simple tests to investigate the sense of touch. Recording outcome: photos and oracy discussions.
7. How do my senses help me? (I)	Children ask and answer questions about sight. They carry out a series of investigations focusing on the question—Why do we need two eyes?	To gather data to help answer a question: Why do we have two eyes. Recording outcomes: simple observations from the results of simple tests.
8. Review and Assess.	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum
Working Scientifically	Children perform simple tests to answer questions about body parts and their functions—observing, identifying and classifying their results. Recording Outcomes: Consolidating use of Venn Diagrams to sort; completing simple table.	Relate the unit to the fact that we are all unique and different—No Outsiders links with 'Max the champion' about hearing loss.
Animals including humans.	Children identify and label the body parts and their functions, learning about their importance through a series of investigations.	Disability awareness week. Helen Keller: D3 Famous author and educator who is visually and hearing impaired.

Outcome	Character Traits	Stickability	WOW
Oracy outcome- as part of their review, children in role as Health professionals, explaining the importance of our body.	Respectful	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts.	Sensory loss visitor to ask and answer questions. Children in role as

Y1 - Science Plant Parts (School Days—History)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees - identify and describe the basic structure of a variety of common flowering plants, including trees.	bark	The protective outer layer around the trunk and branches of a tree.	trunk	The stem of a tree.	Links to Forest Schools—bug hunts, leaf identification, observing. Make links with gardening and allotment projects.
	fruit	A part of some plant that develops from flowers.	petal	A part of a plant that is brightly coloured.	
	Blossom	A flower or part of a flower that can turn into fruit.	root	A part of a plant that is usually underground and supports the plant.	
	buds	A part of a tree that will form a new leaf.	stem	A part of a plant that grows upwards towards the sun and supports the flowers.	
	deciduous	A tree that sheds its leaves in Autumn and grows new ones in Spring.	leaf	A plant part that makes food for the plant.	
	evergreen	A tree that loses and regrows leaves throughout the year.	soil	The material in which most plants grow.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What do we know about plants? (Introductory knowledge + E1)	Children review current knowledge from 'Seasonal Change' unit, understanding that plants are living things; they change across the seasons (refer to apple tree learning); some lose their leaves (deciduous). Explore the outdoor space and identify changes in Spring.	To identify and name wild, garden, deciduous and evergreen plants and trees. Equipment: tablets to take photos of the change in plants since seasonal change unit.
2. What plants are in our school grounds? (E2)	Children learn that plants can grow without being planted by a person—these are called 'wild plants'. They understand how to use an identification poster to name plants that grow in the school grounds. They choose a plant to study over time, recognizing that changes will occur.	To identify and name wild, garden, deciduous and evergreen plants and tree. Make observations. Equipment/skills: using a simple plant identification key; tablets to take photos of their chosen plant over time. Recording outcome: labelled diagram.
3. Plant parts. (E3)	Children learn that plants are made up of different parts and each has a specific job to do (see glossary above). They label leaves, roots, stem, flowers on diagrams.	To identify parts of a plant. Recording outcome: matching labels to diagrams.
4.How do plants begin? (D1)	Children learn that plants begin from either seeds or bulbs. They sort seeds and bulbs and recognise some of the key differences.	To classify bulbs and seeds in different ways. Make observations over time. Recording outcome: sorting hoops for the bulbs and seeds.
5. Why are leaves important? (D2)	Children examine leaves in detail. They recognise leaves can be different shapes (lobed, simple, needle-like), sizes and colours. They have different margins and grow in different ways on the branch. Children know that leaves have stalks and veins, making drawings and field sketches of different ones.	Observe closely, simple using equipment. Equipment: Hand lenses and digital microscopes. Recording Outcomes: observational drawings; field sketches.
6.Why are plants important? (D3)	Children know that plants are important to feed humans and animals. They recognise that plants also provide shelter for some animals.	Ask simple questions about plants. Link with Homelearning to support children to investigate questions raised in class.
7.Plant Study (I steps)	Children recognise and can talk about some of the key observable changes in a plant over time, e.g. new leaf growth, blossom etc.	Gather and record data to answer questions. Equipment: tablets to take photos of plant they have been studying. Recording outcomes: observational drawings and field studies.
8. Tree Study. (I steps)	Children understand that trees are all different and the way to identify them is through looking at bark, leaves, buds and other factors. They perform simple sketches and observations of a given study tree in order to identify it using a chart.	Gather and record data to answer questions. Recording outcome: field drawings; labelled diagrams; bark rubbings.
9. Review and Assess.	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes				Diversity in the Curriculum
Working Scientifically	Children observe, identify and classify different plants and trees using a range of data gathered through fieldwork and research.			Link to knowledge on weather—what weather makes it easy for some plants to grow? What weather makes it hard? Which places in the world experience these harsh climates? Explore how food production and access to fresh water and ingredients can be affected by weather and climate.
	Key data recording outcomes: Diagrams and field studies.			
	Key pieces of equipment to introduce/consolidate: Hand lenses and digital microscopes.			
Plant Parts.	Children learn to identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. They are able to describe the basic parts and know more about the natural world around them.			
Outcome	Character Traits	Stickability	WOW	
Children grow bean shoots or other plants to see what happens over time .	Curiosity	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts.	Link to Forest School—use the area for exploration of observable change and also to gather items for a sharing table.	

Y1 - Science Animals Parts (School Days—History)

Curriculum Objectives		Vocabulary				Links Across the Curriculum
- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals - identify and name a variety of common animals that are car-nivores, herbivores and omnivores - describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, in-cluding pets)		amphibian	An animal that has moist skin and lives on land and water.	fin	A flat part that sticks out of a fishes body to help it move and balance.	Links with English—The Ugly Duckling and Three Billy Goats Gruff.
		bird	An animal that has feathers, two wings, two legs and a beak.	beak	The hard, pointy part of a birds face that contains it's mouth and nostrils.	
		mammal	An animal that has fur or hair and four limbs.	herbivore	An animal that eats only plants.	
		reptile	An animal that has dry, scaly skin and has either four legs or no legs.	omnivore	An animal that eats both meat and plants.	
		fish	An animal that lives in water and has scales, gills and fins.	carnivore	An animal that eats only meat.	
		feather	One of the many soft parts that cover a birds body.	invertebrate	An animal with out a backbone.	

Lessons Sequence	Substantive Knowledge / Key Knowledge		Disciplinary Knowledge / Skills
1. What is an animal? Identifying animal parts. (I and E1)	Based on prior learning around the human body, children learn that groups animals have some common parts including eyes and a mouth, and some different body parts such as fins and wings. They label and describe the basic structures of a variety of common animals, in-cluding fish, amphibians and reptiles.		To identify and classify based on observable features.
2.How can we group animals? (E2)	Children learn that animals can be grouped according to their observable features, for example all birds have a beak, two wings, two legs and feathers. They describe and compare the structure of a variety of common animals.		To identify and classify based on observable features. Recording outcome: simple grouping tables to sort animals.
3.Sorting and pattern seeking (E3)	Children learn that data can be sorted and presented in different ways such as Venn diagrams or bar charts. They understand how to use a Carroll diagram to sort animals using their observable features using 'yes' or 'no' information.		To identify and classify based on observable features. Recording outcomes: Carroll Diagram
4. What do pets need? (D1)	Children learn that all living things need food, shelter and warmth to survive. They look at how this is provided to different pets, encour-aging children to draw on their background and personal knowledge of caring for a pet.		To gather and record data to help in answering questions. Record-ing outcomes: simple block graph of favourite pets.
5. Carnivores, herbivores and omnivores. (D2)	Children learn that animals eat different things and are adapted for their diet e.g. carnivores had eyes on the front of their head and sharp teeth to hunt. Children use Venn diagrams to sort animals into carnivores, omnivores and herbivores.		To identify and classify animals based on what they eat. Recording outcomes: Venn diagrams.
6.Observations and simple tests. (D4)	Children learn that information about an animals preferences can be gathered through simple experiments. The teacher leads small group investigations to discover if animals prefer loud/quiet noises, dark or light places, wet or dry places. A choice chamber can be used, e.g. with woodlice. They learn how to report this to others in an interesting way.		To perform simple tests. Equipment: simple equipment to create a pet home. Recording outcome: diagrams.
7. Earthworm Study (Innovate)	Children apply their scientific understanding by investigating and observing earthworms. They carry out simple tests to understand earthworms are invertebrates, omnivores and prefer dark, wet places.		To perform simple tests. Equipment: simple equipment to create a pet home. Recording outcome: diagrams.
8.Review and Assess.	Children review and summarise their learning from data gathered. They complete the online google quiz.		

Themes			Diversity in the Curriculum	
Working Scientifically	Children sort, identify and classify different animals based on their observable features. They carry out simple tests to answer questions about ani-mals preferences. Key data recording outcomes: simple block graphs; venn diagrams; grouping tables.		Explore the work of Jane Goodall who researched primates.	
Animal Parts	Children make links with learning on human parts, noting similarities and differences between groups of animals. They know more about the natural world around them.			
Outcome	Character Traits	Stickability		WOW
Children create a home for a creature based on what they understand that creature needs. (mini den building).	Respectful	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts.		Looking after a class 'pet'.

Y2 - Science Human Survival (Movers and Shakers—History)

Curriculum Objectives		Vocabulary				Links Across the Curriculum
- notice that animals, including humans, have offspring which grow into adults - find out about and describe the basic needs of animals, including humans, for survival (water, food and air) - describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	adult	A period in life when an animal, including humans have fully grown and can reproduce.	hygiene	Cleaning actions that help humans stay healthy and prevent illness.	No Outsiders—The Odd Egg (offspring). Remarkable Recipes—food groups.	
	aerobic exercise	Exercise that makes your heart beat faster and strengthens lungs.	Survival	To stay alive.		
	balanced diet	A diet including mixture of 5 food groups.	basic needs	What a living thing needs to survive.		
	food groups	Carbohydrates, protein, dairy, fats and oils.	offspring	The young of a plant or animal.		
	reproduce	Process in the life cycle where animal produces offspring.	muscle	A part inside the body which allows humans to move.		
	germ	A microorganism that causes illness—bacteria.	shelter	A place which protects animal from danger and bad weather, such as burrows.		
Lessons Sequence		Substantive Knowledge / Key Knowledge				Disciplinary Knowledge / Skills
1. What is the human lifecycle? (Introductory + E1)		Review prior knowledge that humans are living things and a type of animal called a mammal that grows and changes; it has senses and body parts with specific functions (google forms). Children learn and order the different stages of human life— baby, toddler, child, teenager, adult, elderly.				To identify and classify the stages of human life.
2. What do humans need to survive? (E2)		Children learn that humans need air, water, sleep, shelter and food to survive. They discuss which is most important and why and consider the effect of sleep, love and space in also helping humans survive and thrive.				To ask simple questions and use their ideas to answer them. Data recording: simple block graph of our favourite need.
3. What helps humans stay healthy? (D1)		Children learn that a healthy lifestyle includes good hygiene, plenty of sleep and a balanced diet. They learn that there are 5 food groups— carbohydrates, dairy, oils and fats, protein. They use the eatwell plate to show what a balanced diet looks like. Children use food diaries to examine the diets of different people. They can respond to written questions orally with a partner then in written form in books.				To identify and classify different food groups.
4. Exercise investigation. (D2)		Children learn about types of exercise and flexibility such as strength, balance, aerobic and stretch exercising. They learn about ways to improve these through regular practice and carry out simple investigations over a couple of weeks.				To gather and record data to help answer simple questions. Equipment/skills: using a timer. Recording skill: simple tables.
5. Exercise investigation—follow up. (D3)		Children learn to look for patterns and trends in data. Children present their findings in role as an gym trainer persuading people to complete training and see benefits. Class teacher could illustrate the improved fitness trend through a line graph.				To gather and record data to help answer simple questions.
6.What is good hygiene? (D4)		Children learn that to stay healthy we need good hygiene. They learn that germs are microorganisms that can cause illness and ways to avoid/reduce germs e.g. washing, coughing and sneezing into tissues and disposing of them. Learn about the frequency with which to carry out these activities.				To ask simple questions and use their ideas to answer them. Recording outcome: simple table.
7. Handwashing Investigation.		Children will carry out an investigation to learn that soap and warm water are best for hand washing. They will investigate how to change conditions and observe changes. They will record their findings with predictions, photos and write about their results.				Perform simple tests and investigations, observing results and drawing conclusions.
8. Investigating the spread of germs.		Children will learn that germs spread from person to person through direct and indirect contact. They will carry out a simple test to find this out using glitter and petroleum jelly. They will observe how germs might spread and record on a map of where the glitter has spread.				Perform simple tests and investigations, observing results and drawing conclusions.
9. Review and Assess.		Children review and summarise their learning from data gathered. They complete the online google quiz.				
Themes						Diversity in the Curriculum
Working Scientifically		Children gather data through simple investigations and tests, to find out how germs spread, why exercise is good for us and answer other questions posed. Key data recording outcome: simple tables; introduction through shared work to a bar chart. Key pieces of equipment to introduce/consolidate: timer.				Mary Seacole—British Nurse in Crimea who helped the wounded soldiers. Remembered for her bravery and medical skills, as well as for overcoming racial prejudice in Victorian society.
Animals and other humans.		Children understand that there are basic things we need to survive and some things also help humans to thrive. They understand the importance of healthy diet and good exercise.				
Outcome		Character Traits	Stickability		WOW	
Create a poster for Sports Day or Curriculum Enrichment, about some of the exercises that have been tried.		Curiosity	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.		Glitter Experiment. Exercise investigation.	

Y2 - Science Habitats (Movers and Shakers—History)

Curriculum Objectives		Vocabulary—build on previous vocab from Y2 Human survival, Y1 Animal Parts				Links Across the Curriculum	
- explore and compare the differences between things that are living, dead, and things that have never been alive - identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other - identify and name a variety of plants and animals in their habitats, including microhabitats - describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.		habitat	A place where plants and animals live.	food chain	A diagram showing the feeding relationship between living things.	Forest Schools: Use the outdoor Forest School Area as the 'Habitat' study base for investigation and exploration.	
		shelter	A place that provides warmth for a living thing.	predator	An animal that hunts, kills and eats other animals.	Geography 'Let's explore the world' unit: learn about a wider range of larger habitats around the world that have different climates.	
		living/non-living	A plant or animal that grows, breaths, has offspring, excretes, moves and senses.	prey	An animal that is hunted and eaten by other animals.	Builds on Y4/Y5/Y6 Living things & their habitats.	
		microhabitat	A small place where living things live e.g. under a leaf.	camouflage	The ability to hide/blend in with surroundings.		
		minibeast	An small invertebrate such as an insect.	woodland	An area covered in trees.		
		adaptation	A change in appearance or behaviour that allows a living thing to survive better.	excretion	A life process by which living things get rid of waste material.		
Lessons Sequence		Substantive Knowledge / Key Knowledge				Disciplinary Knowledge / Skills	
1. What is a habitat? (Introductory)		Review prior knowledge that animals and humans need food, air, water and shelter to survive. Children learn a habitat is a place where plants and animals live. Local habitats include parks, woodland and gardens. Habitats beyond the locality include beaches, rainforests, deserts, oceans and mountains. They learn that all living things live in a habitat to which they are suited and it must provide everything they need to survive. They visit the school area, take photos and add captions to describe the features.				To use their observations and ideas to suggest answers to questions. Equipment: Tablets to take photos of habitats.	
2. Is it alive? (E1)		Children will learn that living things carry out the seven life processes: moving, breathing, using their senses, feeding, getting rid of waste, having offspring and growing. Non-living things include things that have lived and are now dead, such as dead plants and animals, and things that have never lived, such as rocks and water. They do not carry out any life processes. They compare and group living and non-living things.				To identify and classify living and non-living things. Recording Outcome: simple sorting table.	
3. Wildlife Watch! (E2)		Children learn that unknown plants and animals in a habitat can be identified by observing their physical features and comparing them with pictures or descriptions on a spotting sheet or guide. They use spotting sheets from Wildlife Watch website to identify plants and animals in the Forest School habitat and in microhabitats within the area.				To identify and classify plants and animals found locally. Equipment: Tablets to take photos of habitats,; hand lens.	
4. Why do animals choose their homes? (E3)		Children learn that animals eat food found in their habitat. They revisit learning about carnivores, omnivores and herbivores and use research tools to investigate the creatures found in previous study lessons in the forest school area (e.g. woodlice). They consider why particular animals like to live in certain habitats e.g. woodlice like dark, damp places so they live in microhabitats under rocks, wood and away from predators.				To gather and record data to answer simple questions. Equipment: tablets to research..	
5. What is a food chain? (D1)		Children learn how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. Plants always start a food chain because they are producers that make their own food using sunlight. Energy from food is transferred from plants to animals, and between animals, within a habitat. Arrows in a food chain mean 'is eaten by.' They construct food chains, identifying and naming the sources of food.				To record data to help answer questions. Recording Outcome: simple food chain.	
6.How do animals stay safe? (D2)		Children learn that prey animals have different ways to avoid capture by predators. Some use speed to outrun predators; some have body parts that can be used as weapons; some use bright colours to warn predators that they are poisonous; others use body parts to shield themselves from attack. Some prey animals use mimicry to look like other, more dangerous animals; others use camouflage to blend into their surroundings and hide from predators. They create camouflage moths to investigate the effectiveness of this adaptation.				To ask simple questions and recognise that they can be answered in different ways .Recording outcome: simple pictogram of which moths they found the most of.	
7. Plant Adaptations (D3)		Plants have adaptations that protect them from being eaten by animals. Some plants grow sharp spines; some have thorns on their stems; and others have hairs covering their stems and leaves to stop insects from eating them. Some plants have prickly leaves; some have stings; and others produce poisonous chemicals. Other plants camouflage themselves so animals do not see them as food, while others provide homes for other animals that provide protection from predators. They sort a range of plants using these criteria.				To ask simple questions and recognise that they can be answered in different ways .	
8. Mystery Habitat! (Innovate)		Children will learn to apply their knowledge of habitats, food chains and adaptation as they identify animals, plants and other features in a mystery habitat. They will use the video clip as stimulus and can record their ideas through oracy discussion, using each frame of the video as another clue—I think it is ...because... They can then write some fact cards about the habitat, using the knowledge they have gleaned. They understand that animals live in habitats that are suited to their needs.				To use their observations and ideas to suggest answers.	
9. Review and Assess.		Children review and summarise their learning from data gathered. They complete the online google quiz.					
Themes						Diversity in the Curriculum	
Working Scientifically		Children identify and name a variety of plants and animals; they group, sort and compare living and non-living things. Key data recording outcome: simple tables; optional pictogram. Key pieces of equipment to introduce/consolidate: tablets for research /photos. .				Jane Goodall: A female primatologist, known for her environmental work protecting the habitats of apes.	
Living things and their habitats.		Children immerse themselves in the outdoors to fulfil this unit, using the forest school environment to explore and identify living things and their habitats. They use real-life examples from the locality to create food chains and understand how plants and animals are adapted.					
Outcome		Character Traits	Stickability		WOW		
Oracy discussion around Mystery Habitat.		Articulate	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.		Using the Forest School area to explore habitats.		

Y2 - Science Uses of Materials (Coastline -Geography)

Curriculum Objectives	Vocabulary—build on previous vocab from Y1 Everyday Materials				Links Across the Curriculum
- identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses - find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	manmade	Made by man e.g. glass	opaque	A material that stops light travelling through.	DT unit Beach Hut: children investigate materials that are used to make a beach hut. Builds on Y5 Properties on materials.
	natural	Found in nature.	suitable	When something is matched appropriately.	
	material	What things can be made from e.g. glass or metal.	texture	The feel of something.	
	property	A quality a material has.	conclusion	Using results to draw a summary of what has been found,	
	absorbency	The ability to soak up liquid.	bendy	Being pushed or pulled into a new shape without breaking.	
	waterproof	A material that does not let water pass through.	transparent	A material that you can see through.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What's it made of? (Introductory and E1)	Review prior knowledge about materials from Y1. Ensure they are familiar with the terms man-made and natural and can name some different materials that fall into these groups. Children learn that materials found in the environment can be natural (rock, stone, water, sand, soil, water and clay) and man-made (brick, glass, plastic and concrete). Natural and man-made materials are used to make human features. The revisit knowledge around properties—absorbent, waterproof, flexible. Children apply their knowledge through a materials hunt around school.	To observe and compare different materials in order to identify and classify them. Recording outcome: simple sorting table.
2. How can we change materials? (E2/3)	Children learn that some objects and materials can be changed by squashing, bending, twisting, stretching, heating, cooling, mixing and being left to decay. They test a range of materials to identify how they can be changed—plastic, wool, clay. They understand that bending is pulling or pushing a material until it is no longer straight. Stretching is pulling or pushing a material to make it thinner, longer or wider. Twisting is turning a material until it makes a spiral shape. Squashing is pushing a material so that it becomes flatter. They learn how materials are changed by heating, e.g. melting chocolate.	To observe closely, using simple equipment.
3. Material uses. (D1)	Children learn that a material's physical properties make it suitable for particular purposes, such as glass for windows and brick for building walls. Many materials are used for more than one purpose, such as metal for cutlery and cars. They understand that an object may be made from different materials e.g. pan—metal and plastic. They apply their knowledge by drawing labelled diagrams putting on relevant information about material and it's use.	Perform simple tests and use their observations and ideas to suggest answers to questions.
4. Which paper is the best? (D2)	Children learn that materials are suited to uses. They investigate the suitability of different papers for different uses e.g. wrapping a parcel, mopping up a drink etc. They carry out mini investigations on strength, absorbency and texture and draw conclusions from their results.	Gather and record data to answer simple questions. Equipment: pipettes; timers; hand lenses.
5. Which bag is best? (Innovate)	Children review the properties of materials. They consider questions to investigate about a range of bags made from different materials—which bag is best for shopping? Which bag could I use in the rain? Which bag squashes into the smallest space to carry with me? They plan how to test the bags in order to answer a given question.	Ask simple questions that can be answered in different ways.
6.Which bag is best? (Innovate)	Children carry out their planned investigations. They learn that results help them to draw conclusions and to answer a question.	To gather and record data to help in answering questions. Equipment: pipettes; timers; hand lenses.
7. Review and Assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes				Diversity in the Curriculum
<i>Working Scientifically</i>	To perform simple tests, record results and make conclusions to help answer questions. Key pieces of equipment to consolidate/introduce : pipettes; timers; hand lenses. Key data recording outcomes: simple tables			Walter Lincoln Hawkins: American engineer who invested a long-lasting plastic which was used to cover telephone wires, allowing rural households to be connected, introducing telecommunications to millions of people.
<i>Uses of materials.</i>	Children engage with the world around them, discussing and making observations on what they see. They enquire with curiosity about the uses and suitability of materials.			
Outcome	Character Traits	Stickability	WOW	
Design an advert for the 'best bag' from Lesson 6.	Curious	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	Clay work. Melting chocolate buttons.	

Y2 - Science Plant Survival (Coastline -Geography)

Curriculum Objectives		Vocabulary—build on previous vocab from Y1 Plant Parts				Links Across the Curriculum
- observe and describe how seeds and bulbs grow into mature plants - find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	seed	A small object that a plant makes to grow new plants.	nutrient	A substance that plants and animals need to stay alive and grow well.	Art Flower Head unit: children look closely at flowers and observe their parts in order to sketch or paint. Forest Schools—using the local grounds to explore and hunt for plants and wildlife. Builds on plants in Y3 & Y5	
	bulb	A swollen stem that contains a tiny plant and a store of food.	roots	A part of a plant usually underground that takes in water and nutrients.		
	germination	The first stage of plant growth when a seed grows.	stem	A part of a plant that grows upwards and supports the flower.		
	identify	To know what something is.	tunic	The papery outer layer of a bulb.		
	conditions	What the plant needs to grow well.	data	Collected facts including numbers, graphs, or observations.		
	basal plate	The flat part of the bottom of the bulb where the root grows.				
Lessons Sequence		Key Knowledge				Disciplinary Knowledge / Skills
1. All about plants. (Introductory)		Review prior knowledge about plants from Y1. Ensure children know that many plants grow from seeds or bulbs. They learn that different plants grow in different habitats and change with the seasons. They consolidate knowledge that plants have roots, stems, leaves, flowers and fruit. They consolidate knowledge that trees have roots, a trunk, bark, branches and leaves.				To use their ideas to answer questions. Equipment: plant identification apps on tablets.
2. What plants grow when? (E1)		Children learn that plants grow from seeds or bulbs and that they change across the seasons. They consider what plants they might see in the current seasons and go outdoors to explore the habitats around the area. They record their findings through photos and sketches of plants. They use classification sheets to help identify plants.				To identify and classify plants in the locality at that time of year. Equipment: plant identification apps on tablets.
3. What is germination? (E2)		Children learn that plants grow from seeds and bulbs. Seeds and bulbs need water and warmth to start growing (germinate). As the plant grows bigger, it develops leaves and flowers. They look at seeds of varying shapes and sizes and compare. The children learn to apply what they know about germination in order to grow cress, deciding on which conditions their cress will grow best. They learn that to grow plants need sunlight, water and a suitable temperature.				To use observations and ideas to suggest answers to questions.
5. Do bigger seeds take longer to germinate than smaller seeds? (Innovate)		Children learn that to answer a question we need to set up an investigation. They learn how to change one thing and keep others the same to make a test fair. They apply their prior knowledge about germination to predict what plants need to grow and consider the question, 'Do bigger seeds take longer to germinate than smaller ones?' Children set up the experiment using broad bean seeds and cress seeds. They keep growing conditions the same.				To gather and record data to answer simple questions. Equipment: measuring jug.
4. Where does grass grow? (D1)		Children develop their observational skills by looking closely at the conditions needed for growing grass. They make predictions based on prior learning which they then investigate in a series of locations around the school. They draw on prior learning about the conditions for				To perform simple tests.
6.Do bigger seeds take longer to germinate than smaller seeds? (Innovate)		Children carry out their planned investigations. They learn that results help them to draw conclusions and to answer a question. They create bar charts that show the number of days it took for each seed to germinate. They can develop a seed packet for their given seed,				To gather and record data to answer simple questions.
7. Review and Assess		Children review and summarise their learning from data gathered. They complete the online google quiz.				
Themes						Diversity in the Curriculum
Working Scientifically		To gather data about growing over time. To interpret this data and draw conclusions about what plants need to grow and other posed questions. Key equipment to consolidate/introduce: water spray, measuring jug, tablet with plant identification apps. Key recording outcomes: simple tables.				Mary Seacole: used plants in her herbal remedies. George Washington Carver: The 'Peanut Wizard', remembered for his work encouraging people to grow peanuts and for developing products from them. He also promoted ways to improve the soil. Marie Clark Taylor: Studied the influence of light on plant growth.
Plants		Children develop their understanding of the natural world through study of plants.				
Outcome		Character Traits	Stickability	WOW		
Children create a seed packet with relevant information on.		Curious	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	Growing cress heads.		

Y3 - Animal Nutrition and the Skeletal System (Through the Ages- History)

Curriculum Objectives		Vocabulary—build on previous vocab from Y1 and 2 Animal and human diets				Links Across the Curriculum	
- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat - identify that humans and some other animals have skeletons and muscles for support, protection and movement		Ball and socket joint	A type of joint that allows movement in all directions, such as the shoulder.	relax	When a muscle lengthens, going back to its normal size.	DT Cook Well, Eat well: children revisit food groups and what makes a healthy meal in order to plan and cook ratatouille. Builds on Y4.Y5/Y6 (digestion/reproduction/muscular system/circulatory system).	
		Bicep	A skeletal muscle at the front of the upper arm that works in a pair with the triceps to bend and straighten the arm	Hinge joint	A type of joint that opens and closes in only one direction, such as the elbow.		
		Tricep	A skeletal muscle at the back of the upper arm that works in a pair with the biceps to bend and straighten the arm.	Food groups	The different groups of food such as dairy, carbohydrate, protein and fats.		
		Muscle	A soft tissue, usually made up of many stretchy fibres, that contracts to create movement.	Diet	The types of food that a person or animal usually eats.		
		Endo and exo skeleton	A type of skeleton that's located inside (endo) or outside (exo) of the body.	Pivot joint	A type of joint that only allows limited rotating movements, such as the top two spinal vertebrae.		
		contract	When a muscle shortens and tightens to create movement.	cartilage	A spongy tissue that cushions and protects joints and allows bones to slide easily		
Lessons Sequence		Substantive Knowledge / Key Knowledge				Disciplinary Knowledge / Skills	
1. Review prior learning. (IK)		Children review prior learning. They consolidate knowledge of what animals and plants need to survive; body parts of animals and humans.				Identify animals and plant survival needs (air, water, food, shelter, sleep and space).	
2. What is the human diet? (E1)		Children learn that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. Children use the terms omnivore, carnivore and herbivore when discussing diets of humans and animals. Children ask questions about the human diet and use research tools to find the answers.				To ask relevant questions and use different types of scientific enquiry to answer them .	
3. What makes a healthy diet? (E2)		Children learn humans need a healthy diet which consists of different food groups—carbohydrate, dairy, protein, fats and oils and fruit and vegetables. They learn to sort items and design a healthy plate of food.				To classify and present data in a variety of ways to answer questions. Equipment: sorting hoop. Recording outcome: sorting food groups.	
4. Fatty Foods investigation (E3)		Children learn that foods contain different amounts of fat. They understand that tests can be carried out by following a set of planned instructions. They understand that a prediction is a best guess for what might happen based on some prior knowledge. They set up an investigation to find out which food contains the most fat.				To set up simple practical enquiries, comparative and fair tests . Recording outcomes: simple table.	
5. What do animals eat? (E4)		Children revisit the learning from Y1 and 2 and the terms herbivore, carnivore and omnivore. They consolidate knowledge that animals, like humans, cannot make their own food but get their nutrition from what they eat. They learn to compare and contrast animal diets, understanding that animal diets change because of seasonal conditions which affect the availability of their food. They learn some ways that animals adapt and prepare for this such as hibernation and storing food for winter.				To identify differences, similarities or changes related to simple scientific ideas and processes. Recording outcome: simple tables, Venn diagram to compare.	
6. Why do we need bones? (D1)		Children learn that humans and some animals have a skeleton that protects, supports and helps to move their body. They label bones in the body and learn that some animals with a spine are called vertebrates.				To record findings using simple scientific language and labelled diagrams . Equipment: (optional hand lens to look at bone) Recording outcome: labelling activity.	
7. What are joints for? (D2)		Children learn that joints are where two or more bones meet and they help the body's flexibility and help it to move easily. They learn there are three types of joint in the body —ball and socket, hinge, pivot joints. They carry out simple investigation to understand how joints work.				To set up simple practical enquiries , comparative and fair tests.	
8. Why do we have muscles? (D3)		Children learn that muscles are soft tissues made of many stretchy fibres. They allow humans to move, breathe and digest their food. They learn how muscles attached to the skeleton work in pairs to move by relaxing and contracting (bicep and tricep)				To make careful observations .	
9.Are all animal skeletons the same? (D4)		Children identify and group animals that have no skeleton, an internal skeleton (endoskeleton) and an external skeleton (exoskeleton). They learn that animals have skeletons for support, movement and protection. Endoskeletons are those found inside some animals, such as humans, cats and horses. Exoskeletons are those found on the outside of some animals, such as beetles and flies. Some animals have no skeleton, such as slugs and jellyfish.				To classify and present data in a variety of ways to answer questions. Recording outcome: sorting skeletons in a table.	
10. Asking questions (Innovate)		Children ask relevant questions and using different types of scientific enquiries to answer them, e.g. Do longer femurs make you jump further? Suggested activity using measuring skills to measure standing jumps against femur length of children in the class. Other questions could be investigated (Innovate 1)				To use straightforward scientific enquiry to answer questions or support findings . Equipment: may vary—measuring equipment e.g. tape measures, metre sticks.	
11. Review and Assess		Children review and summarise their learning. They complete the online google quiz.					
Themes						Diversity in the Curriculum	
Working Scientifically		Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions Key pieces of equipment to consolidate/introduce : sorting hoops, measuring equipment.				Rosalind Franklin: born in 1920, was a British biophysicist known for revolutionary work discovering DNA, as well as understanding X-rays and molecular structure. Kathleen Lonsdale: an early pioneer of X-ray crystallography	
Animal and Human skeleton and nutrition		Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food, they get nutrition from what they eat. They build on knowledge of healthy diets. They recognise the similarities and differences between animals and humans and be-					
Outcome		Character Traits	Stickability		WOW		
Children design a healthy Menu.		Articulate	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.		Fatty Foods experiment Make your own healthy meal (DT link)		

Y3 - Rock and Soils (Rocks, Relics and Rumbles)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties - describe in simple terms how fossils are formed when things that have lived are trapped within rock - recognise that soils are made from rocks and organic matter.	Soil	The upper layer of earth in which plants grow, a black or dark brown material typically consisting of a mixture of organic remains, clay, and rock particles.	Preserved	maintain something in it's original state.	Geography link, Rocks, relics and rumbles: looking at volcanoes and the formation of the earth. English link: writing a diary in role as Mary Anning, describing the discovery of a fossil.
	Rock	the solid mineral material forming part of the surface of the earth and other similar <u>planets</u> , exposed on the surface or underlying the soil.	Organic	has come from living matter.	
	Clay	a stiff, sticky <u>fine-grained</u> earth that can be <u>moulded</u> when wet, and is dried and baked to make <u>bricks</u> , pottery, and ceramics.	Peat	a brown deposit <u>resembling</u> soil, formed by the partial decomposition of vegetable matter in the wet acidic conditions of <u>bogs</u> and <u>fens</u>	
	Sand	loose granular substance, typically pale <u>yellowish</u> brown, resulting from the erosion of <u>siliceous</u> and other rocks and forming a major constituent of beaches, river beds, the <u>seabed</u> , and deserts.	fossil	the remains or impression of a <u>prehistoric</u> plant or animal embedded in rock and preserved in <u>petrified</u> form.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
How are rocks used? (E1 on R, R, R)	Children learn about the threes types of rocks: sedimentary, metamorphic and igneous. They learn that Sedimentary rocks form from mud, sand and particles that have been squashed together over a long time to form rock, e.g. sandstone and limestone. Igneous rocks are made from cooled magma or lava. They usually contain visible crystals, e.g. pumice and granite. Metamorphic rocks are formed when exist-ing rocks are heated by the magma under the Earth's crust or squashed by the movement of the Earth's tectonic plates. They are usually very hard, e.g. slate and marble. . They consider how the properties make particular rocks useful for their purpose, e.g. slate is useful for roof tiles.	To identify similarities or differences related to simple scien-tific ideas and processes. Recording outcome: matching activity rocks to uses.
How are fossils made? (E2 on R, R, R)	Children learn that fossils are made over millions of years and are the remains of once-living organisms, preserved in rock. They form when living things die in watery conditions .They are covered in mud and the body rots away. They body hardens to form rock and the skeleton turns to rock.	To ask relevant questions and use different types of scientific enquiry to answer them . Recording outcome: simple explanation following watching online video.
What is soil made of? (E4, R, R, R)	Children learn soils are made from rocks and organic matter. There are a variety of naturally occurring soils including clay, sand and silt. They understand that different areas have different types of soil and they examine the soil in their local school grounds.	To set up simple practical enquiries , comparative and fair tests. Recording: sorting tree to identify.

Themes		Diversity in the Curriculum
<i>Working Scientifically</i>	Setting up simple practical enquiries; reporting on finding using written and oral explanations.	Study of Mary Anning: pioneering archaeologist and fossil collec-tor. She made many important discoveries at a time when women were not generally recognised in science.
<i>Rocks and soils.</i>	Children know that understanding about rocks and soils is part of understanding the living world and how the earth was formed. It fits into wider un-derstanding of topics such as The Stone Age and The Romans.	

Outcome	Character Traits	Stickability	WOW
Diary in role as Mary Anning.	Curiosity	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	Geography link—Making a living volcano.

Y3 - Forces and Magnets (Rocks, Relics and Rumbles—Geography)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- compare how things move on different surfaces - notice that some forces need contact between 2 objects, but magnetic forces can act at a distance - observe how magnets attract or repel each other and attract some materials and not others - compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials - describe magnets as having 2 poles - predict whether 2 magnets will attract or repel each other, depending on which poles are facing	attract	When one object moves towards another object.	Push	A force that moves an object away from something.	DT link, Making it Move: building a moving toy, using cams. Geography link, Rocks, relics and rumbles: looking at how the core of the earth is molten metal which creates a magnetic force and makes the earth a huge magnet.
	Force	A push or a pull	repel	When one object pushes another object away.	
	friction	The force between two surfaces as they move across each other.	surface	The top or outer layer of an object.	
	Magnet	An object that produces a magnetic field.	North pole	The end of a magnet where magnetic force is strong. The north pole of a magnet is the pole out of which magnetic field lines emerge.	
	Metal	Type of material that can be magnetic e.g. iron.	South pole	The south pole of a magnet is the pole into which magnetic field lines enter.	
	pull	A force that moves an object towards something.	newton	The unit in which forces are measured.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What is force? (I)	Children learn that an object will not move unless a pushing and pulling force is applied. They learn to sort a range of forces into pushes or pulls.	To classify and group pushes and pull. Recording outcome: sorting pushes and pulls.
2. Contact Forces (E1)	Children learn that some forces need to have contact between them in order for the force to be applied, for example the ones in the previous lesson that show a push or a pull, such as kicking a ball or opening a door.	Refine understanding of scientific vocabulary and concepts. Recording outcome: simple explanations.
3. Frictional forces (E2)	Children learn that frictional forces are forces that act in the opposite direction. Increasing friction will slow things down, while decreasing friction with speed things up. They look at the real life application of friction e.g. on ice skates or football boots. They can identify the frictional force in action	Report on findings from enquiries , including oral and written explanations. Recording outcomes: simple explanations.
4. What is a forcemeter? (E3)	Children learn that forces are measured using forcemeters and in newtons. They learn how to measure pushes and pulls such as opening a door, pulling a chair out or pushing in a drawer.	To take accurate measurements using standard units, and a range of equipment. Equipment: forcemeters Recording outcome: simple table.
5. Investigating friction (E4+5)	Children know that friction occurs when two forces move over each other. They understand that rough surfaces have more friction than smooth surfaces and that friction can slow things down or speed them up. They set up an investigation about surfaces and friction e.g. Which ramp does the car travel down best? They present their work using bar charts and graphs.	To carry out practical activities and use results to draw conclusions , make predictions for new values, suggest improvements and raise further questions. Equipment: forcemeter Recording outcome: simple table.
6. Magnetic Forces (D1,2)	Children learn that magnets have two poles (north and south). Opposite poles (north and south) attract each other, while like poles (north and north, or south and south) repel each other. They explore magnets and record their findings in diagrams.	To record their findings using simple scientific language , drawings and labelled diagrams. Equipment: magnets—horseshoe, marbles, wand magnets Recording outcomes: labelled diagrams, simple observations.
7. Magnetic Materials (D4)	Children learn that some materials have magnetic properties. They understand that magnetic materials are attracted to magnets. All magnetic materials are metals but not all metals are magnetic. They carry out investigations using magnets to determine magnetic materials.	To classify and group magnetic materials, based on observations. Equipment: magnets Recording outcome: drawing own table.
8. Review and Assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	Children ask and answer questions about forces.

Themes		Diversity in the Curriculum
<i>Working Scientifically</i>	Exploring forces using scientific instruments, making predictions and conclusions. Key pieces of equipment to consolidate/introduce : pipettes; timers; hand lenses. Key pieces of equipment to consolidate/introduce: forcemeters, different types of magnets, different metals. Key data recording outcomes: simple tables, explanations and diagrams.	Dr. Myriam P Sarachik (pronounced SAHR-ah-chick): entered and succeeded in a field, experimental physics, where women were a rarity. She was a scientist whose groundbreaking experiments illuminated subtle but fundamental physics in the electronic and magnetic behavior of materials.
<i>Forces and Magnets</i>	Develop understanding of different types of forces including contact and non-contact forces. Investigating magnets and how they work., using that to investigate magnetic materials.	

Outcome	Character Traits	Stickability	WOW
Make a compass using scientific knowledge. Write a letter to a company describing best material for e.g. train, race track etc.	Curiosity	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	DT link—making moving toys. Bringing in own magnetic toys.

Y3 - Plant Nutrition and Reproduction (*Emperors and Empires—History*)

Curriculum Objectives		Vocabulary—build on previous vocab from Y1 and 2 units on Plants				Links Across the Curriculum	
- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers - explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant - investigate the way in which water is transported within plants - explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal		vessels	Tubes that transport liquid around the plant (xylem and phloem)	Stamen	A flower's male reproductive organ.	DT: Greenhouse. Children apply their knowledge of what plants need to grow in order to create a mini greenhouse. Art: Beautiful Botanicals. Children study weaving, print making and sketching with different plants. Builds on Y1 (Plant parts) and 2 Plant (survival)	
		Germination	The process where a plant starts to grow.	Carpel	A flower's female reproductive organ.		
		Flowering plant	Plants that have flowers which are used to make seeds and help the plant reproduce.	Sepal	A green leaf-shaped part of a plant that protects the developing flower.		
		Pollination	The process where pollen is transferred by an animal or the wind from the anther of one flower to the carpel of another flower of the same type	Petal	A part of a flower that is brightly coloured and scented to attract insects.		
		Pollinator	An animal that transfers pollen for the process of pollination.	lifecycle	A series of changes that happen during the life of a living thing.		
		Seed dispersal	The movement of seeds by animals, wind, explosion or water away from the parent plant.				
Lessons Sequence		Substantive Knowledge / Key Knowledge				Disciplinary Knowledge / Skills	
1. What do I know already about the parts and functions of plants? (I)		Children review their existing knowledge that plants need air, water, minerals from the ground and sunlight to survive. They identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. The plant's roots anchor the plant in the ground and transport water and minerals from the ground to the plant. The stem (or trunk) support the plant above the ground. The leaves collect energy from the Sun and make food for the plant. Flowers make seeds to produce new plants. Look at the innovate section—select a question to investigate over time e.g. what happens if a plant gets no sunlight.				Review and deepen prior knowledge.	
2. Why are roots so important? (E1)		Children learn about the uptake of water through a plant by it's roots. They examine different types of roots (fibrous and tapworth) and look at the different ways they are structured.				To make observations , identifying differences and similarities. Equipment: hand lens, digital microscope Recording outcome: labelled diagrams.	
3. What is the stem so important ? (E2a/b leave over a week to see results.) Lesson could be combined with E2a/b)		Children learn about the importance of the stem for carrying water and food around the plant and in supporting the flower and leaves of a plant. They carry out simple investigations over time and make observations about how water is begin transported around a plant.				To set up comparative tests and use results to draw simple conclusions . Equipment: beakers, hand lenses. Recording outcome: photographs/labelled diagrams.	
4. What are vessels in a plant? (E3) Lesson could be combined with E2a/b)		Children learn how to set up a comparative test to investigate the transportation of water around a plant and the importance of vessels. They learn how the test might be made fair by changing only one thing and keeping the rest the same. They make observations over time. (use plasticine or cling film instead of Vaseline)				To set up comparative and fair tests. Present their work in a variety of ways including labelled diagrams using scientific language. Equipment: beakers Recording outcome: photographs/labelled diagrams, photographs.	
5. Investigating leaves. (E4)		Children learn that the function of leaves is to take in sunlight and turn it into food. They compare leaves grown in the sun versus those grown in the shade and understand that leaves in the sun are usually larger because they need more space to collect the sunlight that those in direct sunlight. They make scientific labelled drawings of leaves. Children can work in pairs to create a bar chart.				To gather and record data, presenting it in different ways . Equipment: rulers to measure. Recording outcome: bar chart, tally charts, simple observations.	
6. What is the lifecycle of a flowering plant? (D1)		Children revisit term germination and learn how the lifecycle of a flowering plant begins with germination of a seed, through to creating a seedling, then a young plant which begins to flower as the plant matures. They sequence and order the life cycles, creating drawings with accurate use of scientific vocabulary. They understand that lifecycle means that it continues over again. Paper plates lifecycle. Plant sunflower seeds.				To record findings in diagrams (life cycle) using simple scientific language. Recording outcome: Lifecycle of tomato plant and sunflower, labelling and explaining.	
7. What are the parts of a flower? (D2)		Children learn that the function of a flower is to make seeds. They learn that each part of a flower helps to make this happen. The parts of a flower include the sepal, petal, stamen and carpel. The male stamen includes the anther and the filament. The female carpel consists of the stigma, style and ovary. They label and describe the following parts—petal, stamen, sepal and carpel.				To develop their ideas about functions of a plant and create labelled diagrams . Recording outcome: labelled diagrams.	
8. What do plants reproduce—pollination? (D3)		Children learn that pollination is the process where pollen grains are transferred from the stamen of one flower to the carpel of another of the same type. After pollination, seeds form in the carpel's ovary. A pollinator is an animal that pollinates flowering plants. Some plants are pollinated by the wind. Shared Reading Activity—ensure children can talk about pollination in Big Question. Follow up in Science Book—https://sciencing.com/pollination-activities-for-kids-9634771.html Sequencing activity.				To use straightforward scientific evidence to answer questions . Recording outcome: sequencing of pollination.	
9. How do plants reproduce—seed dispersal? (D4)		Children learn that seeds develop after pollination and that they need to move away from the parent plant. The process of seeds moving away is called see dispersal. They learn that seeds can be dispersed by wind, animals, explosion and by water. Video—David Attenborough also .				To classify and sort seeds according to how they are dispersed. Recording outcome: simple table.	
10. What would happen to plants if...(In)		Look back at question from first lesson—What would happen if plants don't receive any sunlight? They make observations and draw conclusions on their findings..				To use results to draw simple conclusions .	
11. Review and Assess		Children review and assess their learning through a mindmap and then a google quiz.					
Themes						Diversity in the Curriculum	
Working Scientifically		Creating labelled diagrams, setting up comparative fair tests to answer questions and making observations over time. Key pieces of equipment to consolidate/introduce: hand lenses, digital microscopes, measuring equipment. Key data recording outcomes: simple tables, explanations and diagrams.				Agnes Arber: She was the best botanist of her time and initially made her fame by studying the morphology and anatomy of plants. Some of our most fundamental knowledge of plant anatomy is thanks to Arber, specifically about flowering plants	
Plants and reproduc-		Plants are necessary and helpful to the world. They create food for people and animals and are part of a wider food chain. It is therefore important to learn about them so that we are able to protect the conditions for growth and support future food production.					
Outcome		Character Traits	Stickability		WOW		
Children carry out their own research questions and present findings through an oracy outcome.		Articulate	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.		Celery investigations on the stem using dye. Seed dispersal games.		

Y3 - Light and Shadows (Emperors and Empires—History)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- recognise that they need light in order to see things and that dark is the absence of light - notice that light is reflected from surfaces - recognise that light from the sun can be dangerous and that there are ways to protect their eyes - recognise that shadows are formed when the light from a light source is blocked by an opaque object - find patterns in the way that the size of shadows change	Light source	Something that creates light, it might be natural like the sun or artificial like a torch.	Shadow	An area of darkness created when an object blocks light.	DT, Greenhouse: Children apply their knowledge of how light travels through materials in order to create a mini greenhouse. Linked to Y6 Light unit.
	Light	A form of energy that travels in straight lines and makes objects visible.	Sun	A star round which the earth orbits and a natural light source for the earth.	
	opaque	A material that doesn't allow light to pass through and cannot be seen through.	translucent	A material that allows some light to pass through and can be seen through though objects appear blurry.	
	Moon	A natural satellite of the earth that reflects light and can be seen from earth.	Transparent.	A material that allows light to pass through and can be seen through.	
	Ray	A narrow beam of light.	Ultraviolet (UV)	Light from the sun that allows harmful rays that burn or age skin.	
	Reflectors	Materials that bounce light off their surface.			

Lessons Sequence	Key Knowledge	Disciplinary Knowledge / Skills
1. What do I know already about light and light sources? (I)	Children share existing knowledge and are introduced to key vocabulary. They understand that light comes from a source which can be natural (sun) or artificial (torch).	Review existing knowledge and understand new scientific terms . Recording outcome: simple table, simple explanation.
2. Exploring light. (E1)	Children carry out a series of mini investigations to find out that light travels in a straight line; that shadows are made by blocking light; that light is made up of different colours; that some materials reflect light.	Making careful observations and record data in a variety of ways including labelled diagrams. Equipment: light sources e.g. torch, data logger, triangular prisms, mirrors, pen torches Recording outcome: simple observations.
3. Which materials reflect light and which are light sources? (E2)	Children learn that some materials reflect light. Reflective objects let light bounce off them. They carry out simple investigations to compare and sort reflectors from sources. They learn that light sources and reflectors can be natural such as the sun and moon, or man-made such as a light bulb or a bike reflector.	Set up simple practical enquiries to help classify . Equipment: light sources—torches, glow sticks, reflectors—mirrors, foil, high-vis vest, snap bands. Recording outcome: simple table.
4. Which materials are the most reflective? (E3)	Children learn how to set up a comparative test to investigate which materials are reflective. They learn that materials and surfaces that are most reflective are shiny, light in colour and smooth. Fabrics, dark and dull materials are not very reflective.	Set up comparative and fair tests . Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Equipment: pen torches. Recording outcome: simple table.
5. How do we stay safe in the sun (E4)	Children learn that the sun has harmful (UV) rays which can age or damage skin. They learn ways to protect ourselves in the sun by using sunscreen, wearing hats, wearing sunglasses and staying indoors.	Use straight forward scientific evidence to answer questions or to support their findings. Recording outcome: Poster, Beachball, throwing about.
6. How are shadows made? (D1)	Children learn that shadows are made when an opaque object blocks light from a source. They learn that shadows are the same shape as the object that is blocking the light, but can be made larger or smaller by moving the light source closer or further away.	To report on the results of findings . Equipment: photographs. Recording outcome: simple explanations.
7. Do all objects create shadows? (D2)	Children set up a comparative test to investigate which objects create the darkest shadows. They learn that opaque objects create the best shadows. Translucent object create blurry shadows and transparent objects create a very light shadow.	To make observations and report on the results of findings . Equipment: range of opaque, translucent, transparent materials, torch. Recording outcome: answer sheet.
8. How do shadows change? (D3)	Children carry out a series of mini investigations to find out that long shadows are created when the light source is lower, short shadows when it is higher. They find out the closer the light source to the object, the larger the shadow.	To make systematic and careful observations , taking accurate measurements using standard units using a range of equipment. Equipment: torches Recording outcome: labelled diagrams and explanations.
9. How do shadows change 2? (Innovate)	Children take their knowledge of shadows and apply their learning to real life by setting up an investigation to see how shadows change during the day.	To make systematic and careful observations and, where appropriate, taking accurate measurements using standard units using a range of equipment. Recording outcome: sequencing photos, simple explanations.
10. Review and Assess.	Children review and assess their learning through a mindmap and then a google quiz.	

Themes		Diversity in the Curriculum
<i>Working Scientifically</i>	Carrying out simple practical enquiries that help support predictions, from which conclusions can be drawn. Key pieces of equipment to consolidate/introduce: light sources and reflectors, translucent, transparent and opaque materials. Key data recording outcomes: simple tables, explanations and diagrams.	Emelie Du Chatelet: Female physicist and mathematician of the 18th century who translated and provided commentary on Sir Isacc Newton's theories of energy, light and colour.
<i>Light and Shadows.</i>	Light is essential for all life on earth. Some rays are harmful and given global warming it is particularly important that children learn how to stay safe in the sun.	

Outcome	Character Traits	Stickability	WOW
Children create a pair of sunglasses using the best material from their research.	Curiosity.	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	Prisms—creating rainbows.

Y4 - Food and the digestive System (Invasion—History)

Curriculum Objectives	Vocabulary—build on previous vocab from KS1 Animal and human diets and Y3 Animal Nutrition.				Links Across the Curriculum
- describe the simple functions of the basic parts of the digestive system in humans - identify the different types of teeth in humans and their simple functions - construct and interpret a variety of food chains, identifying producers, predators and prey. - recognise that environments can change and that this can sometimes pose dangers to living things.	Excretion	Eliminating waste from the body.	Producer	A living thing that makes it's own food for energy.	Oracy: Lesson 3. Use knowledge of Ecosystems to play oracy game 'what might happen if....?' Children debate what could happen within ecosystems in a variety of scenarios. DT, Fresh Food: using knowledge of healthy diets and how they affect our body and mind. Builds on Y6 Circulatory system.
	digestion	The process whereby food is broken down into small parts that can be easily absorbed by the body.	Consumer	A living thing that eats other living things.	
	Plaque	A sticky coating of food, bacteria and saliva that forms on teeth after eating.	Food chain	A diagram that shows how energy is transferred from one living thing.	
	Canine	A pointed tooth used for ripping an tearing chewy food such as meat.	Food web	A diagram that shows how food chains in an ecosystem link together	
	Incisor	A tooth with a straight, sharp edge used for cutting and slicing.	Ecosystem.	A community of living things and their organisms that interact with each other.	
	Molar	A tooth at the back of the mouth that crushes	Fluoride	A che,mical added to toothpaste to prevent	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What do we know already about food and the digestive system? (I, E1)	Children revisit prior learning about food consumer and producers. They understand that producers make their own food, such as plants, and consumers are living things that eat other things. They revisit terms carnivore (meat eater) herbivore (non-meat eater) and omnivore (both) from Y2 and 3. They learn that all living things are part of an ecosystem. They name some familiar ecosystems such as desert, rainforest and polar and discuss the features of each and the creatures that live there.	Gathering information to answer questions.
2. What is a food chain? (E2)	Children learn that a food chain shows the transfer of energy in a habitat over time. They start with a producer, which is eaten by a primary consumer (prey) which is then eaten by a secondary consumer (predator). They understand that food webs show how food chains in an ecosystem link together and how energy is transferred. They create food chains and webs.	Record findings using labelled diagrams and scientific language.
3. What would happen if....? (E3)	Children learn that ecosystems are interdependent which means thatany change to one part of the ecosystem can affect the other parts. They recognise and name some of the human and natural factors that can affect ecosystems, such as rising sea levels, river pollution and deforestation. Children consider 'What might happen if... ' to a variety of scenarios and the dangers that might be posed to living things e.g. river pollution reducing plant life and in turn the insects and fish that feed on it.	Ask relevant questions and use scientific enquiry to answer.
4. What happens when we eat food? (D1)	Children build on prior learning that we need food for energy and to give us nutrients. They learn that digestion is the process by which food is broken down into small particles that can be absorbed by the body. They learn that what the body doesn't need is excreted in waste. They can describe the purpose of the digestive system, its main parts and functions.	Recording findings using labelled diagrams and scientific language.
5. What types of teeth do we have? (D2)	Children learn that we have different types of teeth which have different functions—canines, incisors, molars and premolars. They build on prior knowledge on how diet affects teeth type e.g. canines are used for ripping and tearing, therefore carnivores have large canines; molars are using for grinding therefore herbivores such as sheep have strong molars and incisors for chopping grass. They carry out simple practical enquiries to see teeth in action such as chewing bread and noticing function.	Drawing conclusions from practical enquiry.
6. How do we keep teeth healthy? (D3)	Children learn about the structure of the teeth and how diet can affect teeth health and oral hygiene. They learn that regular brushing helps prevent plaque build-up; that sugary foods cause tooth decay; that cavities can be caused without brushing. Optional: set up simple practical investigations to see the effects of different types of drink on tooth decay.	Making careful observations and report on findings.
7. Which toothpaste is best? (In 1-5)	Children carry out practical investigation to compare toothpastes. They learn how to keep a test fair by changing one thing and keeping the other variables the same. They learn that the amount of fluoride in a toothpaste determines how well it protects teeth from decay.	Set up simple comparative and fair tests, make observations and draw simple conclusions. Suggest ways to make improvements.
8. Assess and Review.	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum
Working Scientifically	Setting up simple practical enquiries; reporting on finding using written and oral explanations; drawing conclusions from practical enquiry; making careful observations; suggesting improvements to tests.	Edward Tull-Warnock: The first black dentist in the UK who overcame adversity to qualify and practice. Wangari Maathai: responsible for bringing trees back to the Kenyan landscape. Maathai founded the Green Belt Movement, encouraging Kenyans to replant trees that had been cut down for firewood, farm use or plantations. Through her work planting trees, she also became an advocate for women's rights, prison reform, and projects to combat poverty.
Food and the digestive system	Children understand that learning about the body helps us to keep safe and healthy; they understand learning about the environment helps us understand why it is so important to protect it.	

Outcome	Character Traits	Stickability	WOW
Advert for the next tooth paste. Poster for keeping teeth healthy.	Respectful (to ourselves, nature and the environment)	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	Making teeth out of plasticine to understand names and placements. Carrying out comparative tests to see the effect of different conditions on eggs shell (analogous to tooth enamel)

In 2004, Maathai became the first African woman and the first environmentalist to win the Nobel Peace Prize for her efforts to protect the environment.

Y4 - Sound *(Invasion—History)*

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- identify how sounds are made, associating some of them with something vibrating - recognise that vibrations from sounds travel through a medium to the ear - find patterns between the pitch of a sound and features of the object that produced it - find patterns between the volume of a sound and the strength of the vibrations that produced it - recognise that sounds get fainter as the distance from the sound source increases	Sound source	Something that vibrates to produce sound waves such as a musical instrument, a piece of machinery or a vocal chord.	Decibel dB	A unit used to measure the volume of sound.	Music: links with playing a musical instrument, ukele.
	Vibrate	To move back and forth repeatedly.	eardrum	A thin piece of tissue inside the ear through which vibrations pass.	
	Sound waves	A pattern of vibrations created by a sound source that travels through a medium to the ear.	muffle	To reduce the volume of sound, usually by wrapping it in material.	
	Volume	The loudness of a sound.	medium	A material such as a solid, liquid or a gas, that transfers energy from one place to another.	
	Pitch	The highness or lowness of a sound.	sound	Vibrations that travel in waves from a sound source through a medium to the ears.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What do we know already about sound? (I)	Children are introduced to key facts about sounds— that sound is energy that travels in waves from a sound source through a medium to our ears; sound sources vibrate and volume is measured in decibels. They think of questions they might like to ask, based on their scientific understanding.	Ask relevant questions and use different types of scientific enquiry to answer them.
2. Exploring sound. (E1)	Through a range of practical exploration activities children see how sound sources vibrate; how to change volume; which parts of instruments vibrate to make sound; how pitch can be altered in different instruments. They learn about environmental sounds around them and common sound sources.	Set up simple practical enquiries, gathering information to answer questions.
3. How does sound travel? (E2)	Children learn that sound travels in waves through a medium to reach the ear. They understand that when an instrument is played the air around it or inside it vibrates. These vibrations travel as a sound wave. They learn that sound can travel through water as well as air. They might under take practical investigations to understand it fully.	Record findings through diagrams, written and oral explanations.
4. How does the ear hear sounds? (E3)	Children revisit their learning from the previous session about how sound travels. They learn about how the ear funnels sound into the cannal and the vibrations travel down it until they reach the bones in the ear, which have hairs that vibrate and send messages to the brain. They represent their learning with diagrams and labels of scientific language.	Record findings through diagrams, written and oral explanations.
5. How can sound be muffled? (D1)	Children begin to set up comparative test to see which material will muffle sound the best. They learn to measure sound using a log-it and learn that sound it measured in decibels dB. They understand a fair test means changing one thing and keeping the rest the same. They learn that sound can be muffled by inserting a material into the sounds path that absorbs the sound. They understand how prolonged exposure to loud sound can be damaging to the ear and sound muffling is used in noise-cancelling headphones.	Set up comparative, fair tests, make predictions, reporting on findings, drawing conclusions .
6. How does volume change as we move away from the sound source? (D2)	Children understand that scientific enquiries can be set up and carried out by following or planning a method. They plan an investigation to find out how volume changes as we move away. They make predictions— a statement about what might happen in an investigation, based on some prior knowledge or understanding. They understand a fair test is one in which only one variable is changed and all others remain constant. Through their investigation they learn that sounds are louder closer to the sound source and fainter as the distance from the sound source increases.	Set up comparative, fair tests, make predictions, reporting on findings, drawing conclusions .
7. How can we change the volume of sound? (D3)	Children learn to use sound meters to measure sound of different instruments. They consolidate understanding that sound travels in waves of vibrations and that the more energy put into a sound source, the larger the vibrations and the larger the sound waves and the louder the sound. They learn that putting less energy into a sound source means the sound will get quieter.	Identify differences and similarities linked to scientific ideas.
8. How can we change the pitch of sound? (D4)	Children learn that pitch is how high or low a sound is. They carry out an investigation to establish that parts of an instrument that are shorter, tighter or thinner produce high-pitched sounds. Parts of an instrument that are longer, looser or fatter produce low-pitched sounds. They look for patterns and draw conclusions.	Identify differences and similarities linked to scientific ideas.
9. Review and Assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum
<i>Working Scientifically</i>	Set up comparative, fair tests, make predictions, reporting on findings, drawing conclusions .	Welsh singer, songwriter and scientist Megan Watts Hughes is recognised for being one of the first individuals to experiment with the visualisation of resonating sounds — something she achieved using a device called an 'Eidophone'. The contraption consisted of a mouthpiece, a receiving chamber, and a rubber membrane — upon which a variety of powders were sprinkled. Watts Hughes would sing into the device, causing the powders to "resolve themselves into a perfect geometrical figure" upon the membrane. The results would vary depending on adjustments to things like tone and volume. She published a book on the subject in 1904, titled 'The Eidophone Voice Figures: Geometrical and Natural Forms Produced by Vibrations of the Human Voice'. Perhaps even more interesting was the art that she was able to create with her invention — much of which resembles the shapes and patterns seen in flowers and plant life.
<i>Sound</i>	Children learn how it is important to take measures to look after our ears as loud sound can affect our long term hearing.	

Outcome	Character Traits	Stickability	WOW
Children write to a manufacturer about the best material for ear defenders. Create a musical instrument using scientific knowledge.	Curiosity	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	Testing a range of instruments for volume and pitch. Making string telephones.

Y4 - States of Matter (concepts in this unit need teaching prior to the unit *Misty Mountain, Winding River—Geography*)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- compare and group materials together, according to whether they are solids, liquids or gases - observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) - identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Solid	Solids are state of matter of a material, where the particles are close together, they stay in one place, can be held e.g wood.	Evaporation	The process by which a material is heated and turns from a liquid to a gas.	English link: Make links with Charlie and the chocolate factory when discussing the melting and cooling of chocolate. Geography link: understanding the part played by the water cycle in the processes that shape rivers around the world.
	Liquid	A state of matter of a material, where it the particles are close but randomly arranged meaning the liquid can flow and takes the shape of its container.	Condensation	The process by which a material is cooled and turns from a gas to a liquid.	
	gas	A state of matter of a material, where the particles are far apart and if spreads out to fill the space; it cannot be held.	Particles	Microscopic parts of that make up a material.	
	States of matter	Whether a material is a solid, liquid or gas.	Reversible change	A change which can be reversed e.g. ice to water then water to ice etc. Water has a reversible change.	
	Melting	What happens when a material is heated.	rate	How fast something happens e.g. the rate of evaporation.	
	freezing	What happens when a material is cooled.			

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What are solids, liquids and gases? (I)	Children learn that materials can be grouped and sorted according to whether they are solids, liquids or gases. Using visuals, diagrams and videos they learn that solids stay in one place and can be held; some can be squashed, bent, twisted and stretched; examples include wood, metal, plastic and clay. They learn that liquids move around (flow) easily and are difficult to hold; they take the shape of the container; examples of liquids include water, juice and milk. They learn gases spread out to fill the available space and cannot be held; examples of gases include oxygen, helium and carbon dioxide.	To be identify similarities and differences in order to group and classify items.
2. How can we classify different materials? (E1/2)	Children revisit and consolidate learning about what makes a solid, liquid or gas. They look at further examples and classify them. They learn about unusual materials and understand that some materials can exist in more than one state for example foams act like a solid and are part liquid, part gas. Children begin to learn about particle theory—in a solid the particles are close together and arranged in a regular pattern; in a liquid they are close together but arranged randomly; in a gas they are randomly arranged and far apart. They learn how to create labelled diagrams and use scientific language to describe them.	To record findings using labelled diagrams and scientific language to describe them.
3. Can materials change from one state to another? (D1)	Children carry out simple practical enquiries. Through observations they learn that some materials change state when they are heated and cooled, e.g. chocolate melts when held in your hand. They are introduced to the terms evaporation (liquid to gas) and condensation (gas to liquid). The understand that materials have a melting point and a boiling point.	To set up simple practical enquiries, making observations and drawing conclusions.
4. What is a reversible change—focus on water? (D2)	Children learn that water exists in three states. They understand that temperature is measured in degrees Celsius and learn how to use a thermometer or data loggers to measure the temperature of tepid, iced and boiling water. Through this they learn that the changes of state that occur within water are reversible as are changes with other solids like chocolate. They name the changes melting for heating and freezing when materials are cooled. They learn that the change of liquid to gas is called evaporation and the reverse change is condensation.	They make systematic observations taking accurate measurements using standard unit and a range of equipment including thermometers.
5. How does ice melt? (D3/4)	Children learn how to make systematic observations using a thermometer to measure the temperature of ice melting over time. They create line graphs of points over time and draw conclusions about how long it took for the ice to melt, noticing patterns and trends from their data.	They make systematic observations taking accurate measurements using standard unit and a range of equipment including thermometers. They present data in a variety of ways including line graphs.
6. What is the Watercycle? (D2 in Driver Unit)	Children identify the part played by evaporation and condensation in the water cycle. They learn that water in rivers and lakes is warmed by the sun, evaporating and rising as water vapour. As it rises, it cool and condenses to form water droplets in clouds. When the clouds are full they fall as precipitation (rain, snow, hail). They investigate the rate of evaporation with simple practical investigations, linking it the watercycle.	They report of findings from enquiries, including oral and written explanations.
7. Review and Assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes				Diversity in the Curriculum
<i>Working Scientifically</i>	Making systematic, accurate observations using a range of equipment including thermometers and data loggers; creating labelled diagrams using scientific language.			Ancient Greeks—discovery of states of matter through observations of water. Florence Parpart: invented the first electric fridge in 1914, which revolutionized how we keep food fresh.
<i>States of Matter</i>	Through study children are able to make wider links with materials and the world around them, including application through their driver project, which provides context for their learning about evaporation and condensation .			

Y4 - Living things and their habitats *(Misty Mountain, Winding River—Geography)*

Curriculum Objectives	Vocabulary—build on previous vocab from Y1 and 2 Animal and human diets and Y3 Animal Nutrition and the Skeletal System				Links Across the Curriculum
- recognise that living things can be grouped in a variety of ways - explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment	Classification	The arrangement of living and non-living things into groups or categories.	Invertebrate	An animal without a backbone.	Geography link: Misty Mountain, Winding River. Children discuss the groups of animals and plants that can survive in mountainous areas. Art link: Animal Unit. Children look at observable characteristics when sketching a range of animals. Links to Y6 Living things & their habitats.
	Classification key	A set of questions that helps to identify a living thing or decide which group it belongs to .	Exoskeleton	A hard, outer layer that covers, supports and protects the bodies of some invertebrates.	
	Animal Kingdom	One of the groups into which all living things can be divided.	Observable feature	A feature that can be seen.	
	Plant Kingdom	One of the groups into which all living things can be divided.	vertebrates	An animal with a backbone.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What is classification? (I/E1)	Children learn that things can be grouped in a variety of ways, building on prior learning. Through practical grouping and sorting activities they learn that classification is the arrangement of living and non-living things, breaking them into smaller groups based on observable features. They make systematic observations to help them group items.	Make systematic and careful observations.
2. What is a classification key? (E2)	Children learn that classification keys help to group, sort and name a variety of living things in their local and wider environment. They use classification keys, recognizing that they use multi-stage classification to identify a thing. They build on prior learning from Year 1 and 2 classifying a range of animals based on observable features such as 'shell/no shell', 'wings/no wings'.	Reporting on findings using classification keys.
3. Creating a classification key. (E3)	Children revisit learning and create their own classification key, applying their knowledge.	Reporting on findings using classification keys. Identifying differences and similarities.
4. How can we classify plants and animals further? (D1)	Children apply their learning by sorting animal and plant kingdoms. They are introduced to further properties to support multi-classification to sort further e.g. sorting animals into vertebrates or invertebrates.	Reporting on findings using classification keys. Identifying differences and similarities.
5. How can we classify vertebrates further? (D2)	Children learn that vertebrates can be further sorted into groups based on their observable characteristics. They revisit the main groups taught in Y1 and 2—mammal, fish, amphibian, bird, invertebrate. They learn how to use sources of information to answer questions which help them to identify the group a given creature belongs to.	Reporting on findings using classification keys. Identifying differences and similarities.
6. How can we classify plants further? (D4/5)	Children understand that plants can be classified into different groups. They understand how plants can be classified by asking questions about observable characteristics e.g. does it have flowers? Are the flowers yellow? They learn how to create a classification key to group, identify and name a variety of plants in the local area.	Reporting on findings using classification keys. Identifying differences and similarities.
7. Review and Assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum
<i>Working Scientifically</i>	Reporting on findings using classification keys. Identifying differences and similarities.	Maria Sybilla Merian (1647-1717) was working on a project related to caterpillar and butterfly metamorphosis. Merian was the first to draw caterpillars with their food sources in their natural habitats and these “plant-host interactions” ended up being so important taxonomically Merian embarked on a solo expedition to Suriname to study tropical moths and butterflies. Early taxonomists were known to identify new species based on drawings, and it has been suggested that Linnaeus used Merian's drawings to identify over 100 new species. While Merian has been celebrated by art historians for her drawings, she continues to be largely overlooked for her scientific contributions, both during her life and posthumously.
<i>Living things and their habitats.</i>	Children learn that classification, logging and grouping animals helps us to understand the natural world around us and monitor the survival of the different species.	

Outcome	Character Traits	Stickability	WOW
Children create their own classification keys and extend this for other subjects e.g. sorting shapes in maths.	Respectful (to the natural world)	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	Using real life examples of plants to sort.

Y4 - Electrical Circuits and Conductors

(Ancient Civilisations—History)

Curriculum Objectives	Vocabulary—				Links Across the Curriculum
- identify common appliances that run on electricity - construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers - identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery - recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit - recognise some common conductors and insulators, and associate metals with being good conductors	electricity	A form of energy that provides power and makes appliances work.	switch	A component that can make or break a circuit.	PSHC and Safeguarding - Keeping safe. Builds on Y6 Electricity.
	conductor	A material through which an electric current can flow.	complete loop	A circuit that has no gaps in it so electricity can flow around.	
	conductive	Able to let electricity flow through.	mains	Electricity generated in power stations and supplied to buildings through powerlines.	
	insulator	A material that does not allow electrical current flow through.	component	A device used in an electrical circuit e.g. lamp, buzzer, wires, cell.	
	cell	A store of electrical energy that converted to electrical energy and used as a power source.	circuit	A collection of components connected by wires through which electricity can flow.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What needs electricity? (I)	Children evaluate existing knowledge. They learn that electricity is a type of energy and that many appliances are powered by electricity, naming and listing items. They learn that there are two types of electricity—mains and battery-operated. They group and compare items.	Group and compare items and record the findings in tables.
2. What is a simple series circuit? (E1)	Children are introduced to the basic components of a circuit—cells, wires, bulbs, switches, buzzers and lamps. They explore a range of circuits and understand that a circuit must be a complete loop to work, through which electricity can flow.	Make careful observations and report on findings from enquiries using simple scientific language and labelled diagrams.
3. Making a series circuit (E2)	Children learn how to construct simple series circuit with a bulb. They create simple labelled drawings to represent their learning. Make systematic changes to their circuits noting how this affects the component. They then learn how to create more series circuits with different components in.	Make systematic and careful observations recording findings using written explanations and labelled diagrams.
4. Will the circuit work? (E3)	Children learn that circuit need to be in a complete loop with only one path for the electricity to flow n order to work. They sort a range of pictures of circuits and make predictions about whether they will work.	Use results to draw conclusions and make predictions for further values, suggest improvements or raise questions.
5. What is a conductor? (D1/2)	Children learn that wires conduct electricity because they have metal insider them, plastic does not which makes them safe to handle. They understand that materials can be sorted into conductive and non-conductive. They make predictions about the conductivity of materials and tests them in a circuit. They draw conclusions about the kinds of materials that a conductive and learn that metals are good conductors, but plastic is an insulator.	Set up simple practical enquiries, comparative and fair tests.
6. How does a switch work? (D3)	Children examine a a range of switches and learn that a switch works by breaking a circuit so that it is not complete. They apply their knowledge by creating a simple switch.	Use results to draw conclusions and make predictions for further values, suggest improvements or raise questions.
7. Optional Lesson - Exploring plugs (D4)	Children apply their learning of conductors and insulators by looking at the components and materials of a plug.	To observations and draw conclusions from investigations.
8. Review and Assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes				Diversity in the Curriculum
<i>Working Scientifically</i>		Children investigate circuits and various electrical components.		
<i>Electricity</i>		Children learn about electrical appliances and safety.		
Outcome	Character Traits	Stickability	WOW	
Children apply their knowledge possibly using by making a simple appliance such as a torch.	Curiosity	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	Handling and creating circuits. Making their own switches/torches.	

Marie Curie (1867-1934)Curie's work helped shape the world we know today. She discovered uranium rays caused the air around a sample to conduct electricity, discovered the existence of two elements, polonium and radium, and coined the term radioactivity. Curie became the first woman to win a Nobel Prize, the first person to win two, and the only person to win in two different sciences (physics and chemistry).

Alice Gordon, played a pivotal role in the domestication of electricity in the 1880s, alongside her husband. She published books on the subject, including Decorative Electricity (1891), and wrote of her 'personal experiences' as an engineers' wife, showing her expertise about the engineering processes

Y5 - Earth & Space

(Dynamic Dynasties—History)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- describe the movement of the Earth and other planets relative to the sun in the solar system - describe the movement of the moon relative to the Earth - describe the sun, Earth and moon as approximately spherical bodies - use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky	axis	An imaginary line that runs through the centre of an object, such as a planet, about which it rotates.	solar	Related to the Sun.	Seasonal changes in Y1 Maths—links with maths units on measuring mass and weight.
	orbit	The stable, circular path of an object revolving around a central mass with gravitational force, such as the planets revolving around the Sun, or the Moon revolving around the Earth.	space	The area outside Earth's atmosphere.	
	daytime	The time of day between sunrise and sunset when that part of the planet is facing the Sun.	season	A division of the year, such as winter, spring, summer or autumn, which has particular weather patterns & day lengths & is caused by the tilt of a planet's axis as it rotates and orbits the Sun.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. Know what the 'Solar System' in. (Introductory knowledge).	Using resource from Intro section, pupils need to know the Solar System is made up of the Sun and everything that orbits around it. Pupils name planets & research info about them.	Describe or model the movement of the planets in our Solar System, including Earth, relative to the Sun.
2. How we know the sun is in the centre of our solar system? (E1)	Children learn about the scientists whose work led to the heliocentric model of the solar system and look at the evidence that proves the heliocentric model.	Understand how scientists create models of understanding & how they can change over time as new methods/research/equipment emerge. Identify
3. Describe the Sun, Earth & Moon as approximately spherical bodies. (E3)	Children learn that the Sun, Earth, Moon and the planets in our solar system are roughly spherical. They learn all planets are spherical because their mass is so large that they have their own force of gravity. This force of gravity pulls all of a planet's material towards its centre, which compresses it into the most compact shape - a sphere.	Describe the Sun, Earth and Moon as approximately spherical bodies and use this knowledge to understand the phases of the Moon and eclipses.
4. Describe the movement of the Earth & moon. (E2) + (D1)	Children learn earth orbits the sun (365 days/1 year), rotates on its axis (24hrs/1 day), explain the concept of day & night. Make model using CM resource. Children learn about the apparent movement across the sky.	Use models to explain movement of earth & moon. Use drawing to explain day/night.
5. Day length & seasons, (D3)	Children learn that Earth tilts on its axis (23.5°) and how this creates different day lengths and seasons in the northern and Southern Hemispheres as the earth orbits the sun.	Use models to explain seasons & how the lengths of days vary.
6. Times of day around the world. (D5)	Children explain day & night around the world & understand why times zones vary across the globe.	Explain time zones using the earth's movement (spinning on its axis)
7. Phases of the moon. (D1)	Children needs to understand that the Moon orbits Earth in an anti-clockwise direction, rotating of its axis and completing a full orbit every month (apx.28 days). Pupils need to know the different phases of the moon.	Describe or model the movement of the Moon relative to Earth.
8. Lunar & solar eclipses (D2.2) If time allows.	Children learn that the Earth and the Moon align with the Sun, these alignments create either a solar eclipse, where sunlight is blocked by the Moon, or a lunar eclipse, where the Moon is in the Earth's shadow.	Use models to explain alignment of the earth and moon with the sun. Use drawings and diagrams to explain.
9. Review & assess.	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum
Earth & Space	Understand & explain time zones	Understand the background of the different scientists that developed different models of the solar system (Greek, Arabic, etc) Examining theories presented by scientists from different cultures (Greek, Arab, etc) Mae Jemison—first woman of colour to go into space.
Evidence	Understand how knowledge is developing depending on the technological developments as well as developments in understanding.	
Working scientifically.	Identify scientific evidence that has been used to refute or support ideas. Describe key concepts related to earth and space using models, diagrams, drawings and conclusions.	

Outcome	Character Traits	Stickability	WOW
Children use their knowledge of the solar system to create non-fiction texts, model and a 'Space Showcase' for other children across school to view.	Curiosity	Solar system models (homework) as well as models made in school.	Visit to the National Space Centre

Y5 - Forces

(Dynamic Dynasties—History)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object - identify the effects of air resistance, water resistance and friction, that act between moving surfaces - recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	pull	A force that moves an object towards something.	push	A force that moves an object away from something.	Forces & magnets Y3 D&T
	Surface area	The area of an outer part of something.	mechanism	Moving parts that work together to perform a function usually in a machine.	
	lubricant	A liquid, such as oil or water, that is used to reduce friction between different surfaces.	friction	A force between two surfaces as they move across each other.	
	fulcrum	The point at which a lever is supported or balanced.	aerodynamic	Having a shape that reduces air resistance.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. What are contact / non-contact forces (Intro.)	Revisit learning from LKS2. A force is a push or a pull that makes something move, change its speed or change its shape. There are two types of forces: contact forces and non-contact forces. Contact forces include friction, air resistance and water resistance. Non-contact forces include magnetism and gravitational force, or gravity.	Report on findings from enquiries to show secure understanding of prior learning.
2. What is gravity. (E1)	Children learn that gravity is a force of attraction. Anything with a mass can exert a gravitational pull on another object. The Earth's large mass exerts a gravitational pull on all objects on Earth, making dropped objects fall to the ground.	Explain/demonstrate that objects fall to Earth due to the force of gravity
3. What are mass and weight? (E2)	Children carry out investigations to learn that mass is the amount of matter and weight is a measure of gravitational force. A force meter can be used to measure an object's mass in grams (g) or kilograms (kg) and its weight in newtons (N).	Take increasingly accurate measurements in standard units, using a range of chosen equipment.
4. How is friction applied in everyday life? (D1)	Children investigate friction, understanding that different surfaces create different amounts of friction. Smooth, flat surfaces exert a smaller frictional force than rough, bumpy surfaces. Moving objects will travel further on surfaces with less friction.	Compare and describe, using a range of toys, models and natural objects, the effects of water resistance, air resistance and friction. Ensure children understand how to carry out fair tests.
5. What is air resistance (D2)	Children carry out observations learning that air resistance is a type of friction. It is a contact force that acts when an object moves through air. It always acts against the direction of movement. Increasing air resistance makes an object fall to Earth more slowly.	Make systematic and careful observations, using them to make comparisons, identify changes, classify and make links between cause and effect.
6. What is water resistance (D3)	Children carry out observations learning that water resistance is a type of friction. It is a contact force that acts when an object moves through water. It always acts against the direction of movement. Decreasing the surface area at the front of an object reduces the amount of water resistance. The more streamlined an object, the faster it will fall through water.	To plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
7. How do levers work? (D1)	Children learn that a lever is a simple machine that provides a mechanical advantage to make it easier to lift a heavy load. It consists of a lever arm, a fulcrum, a load and effort. As the distance between the fulcrum and the effort increases, the effort needed to lift a load decreases.	Describe and demonstrate how simple levers, gears and pulleys assist the movement of objects.
8. What are pulleys?(D2)	Children learn that a pulley is a simple machine that provides a mechanical advantage to make it easier to lift a heavy load. It consists of one or more grooved wheels and a rope. As the number of wheels, and the number of pieces of rope supporting the pulleys, increases, the effort needed to lift an object decreases, but the distance the rope has to be pulled increases.	Describe and demonstrate how simple levers, gears and pulleys assist the movement of objects.
9. How do gears work? (D3)	Children understand that gears are toothed, interlocking wheels that can be place together to make a mechanism that provides a mechanical advantage. Linking <u>different</u> sized gears create a mechanical advantage.	Describe and demonstrate how simple levers, gears and pulleys assist the movement of objects.
10. Review & assess		

Themes		Diversity in the Curriculum
Gravity	Gravity affects everything but it can vary within the solar system	Emilie Du Chatalet - translated Sir Isacc Newton's book on gravity. She died in child birth a few days after completion.
Engineering	Knowledge & understanding of forces determines design and mechanisms.	
Working	To make observations and carry out investigations, about forces and their wider application.	

Outcome	Character Traits	Stickability	WOW
Children apply their knowledge to their DT topic Moving Mechanisms.	Resilience Curiosity	Practical nature of the learning, e.g. making models, parachutes, etc.	Designing, making & testing parachutes. Other mini investigations throughout the topic.

Y5 - Living things & their habitats

(Sow, Grow and Farm—Geography)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird - describe the life process of reproduction in some plants and animals	amphibian	A cold-blooded vertebrate that lives on land & in water. Female amphibians lay eggs in water.	vertebrate	Having a backbone or spinal column	CM Sow & Grow unit Forest school Y4 Living things & their habitats Y2 Living things & their habitats
	life cycle	A series of changes that happen to one generation during their life.	Gestation period	How long the female is pregnant for.	
	mammal	A vertebrate animal that is warm blooded, gives birth to live young, has fur or hair & breathes air with lungs. Females produce milk to feed offspring.	pollination	transferring pollen grains from the male anther of a flower to the female stigma.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. Animal life cycles (E1)	Build on prior learning— A life cycle is the series of changes in the life of a living thing & includes these basic stages: birth, growth, reproduction & death. Amphibians' life cycles include the stages: egg, larva (tadpole), adolescent & adult. Some insects' (butterflies, beetles and bees) life cycles include the stages: egg, larva, pupa and adult. Birds' life cycles include the stages: egg, baby, adolescent and adult.	Compare the life cycles of animals, including a mammal, an amphibian, an insect and a bird, asking questions and recognising relationships.
2. Classifying mammals (E2)	Children learn a mammal is a vertebrate, which means it has a backbone. The five key mammalian characteristics of mammals are that they produce milk to feed their young, are warm blooded, give birth to live young, have fur or hair and breathe air with lungs.	Record data using classification keys.
3. Mammalian life cycles (E3)	Children understand the processes in mammalian life cycles are birth, growth, puberty and reproduction. The stages in mammalian life cycles are embryo, juvenile, adolescent and adult. The length of time for each stage and process varies between different mammals.	Record findings from enquiries using diagrams.
4. Comparing gestation period with mass (E4) Optional	In general, mammals with a smaller mass have a shorter gestation period, and mammals with a larger mass have a longer gestation period.	reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
5. Human life cycle (E5)	Humans are mammals and have a mammalian life cycle.	Record information using scientific diagrams and labels.
6. SOW, GROW—Geography Topic (E3) Plant life cycle	There are two types of reproduction: sexual and asexual. Sexual reproduction involves two parents (one female and one male) and produces offspring that are different from the parents. Asexual reproduction involves one parent and produces offspring that is identical to the parent.	Describe the life process of reproduction in some plants and animals
7. Dissection—parts of a flower (E4)	Build on and develop learning from Year 3 about parts of a flower include the stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal. Pollination is when the male part of a plant (pollen) is carried, by wind, insects or other animals, to the female part of the plant (carpel). The pollen travels to the ovary, where it fertilises the ovules (eggs). Seeds are then produced, which disperse far away from the parent plant & grow new plants.	Label and draw the parts of a flower involved in sexual reproduction in plants (stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal)
8. Review & assess		

Themes		Diversity in the Curriculum
Working Scientifically	Making observations of living things; recording using diagrams and classification keys.	Maria Sibylla Merian— was a naturalist from the 17th century who spent her life studying the life cycles of plants and insects. She was born in Germany and spent her life as an artist at a time when most women were not allowed to have jobs. Maria Sibylla Merian specialized in studying butterflies. She was one of the first people to include both eggs and the plants that butterflies lived on in her study of butterfly life cycles.
Living things and their habitats.	Children understand that classification and understanding about lifecycles helps us to understand the world around you.	

Outcome	Character Traits	Stickability	WOW
This project teaches children about animal life cycles, including the human life cycle. They explore human growth and development to old age. Link to growing topic.	Curiosity	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	Dissection of a real flower

Y5 - Properties & changes of materials

(Groundbreaking Greeks—History)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- compare & group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical & thermal), and response to magnets - know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution - use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating - give reasons, based on evidence from comparative & fair tests, for the particular uses of everyday materials, including metals, wood and plastic - demonstrate that dissolving, mixing and changes of state are reversible changes	absorbent	To be able to take in or soak up another material.	property	A quality that a material has	Maths—graphs, data & interpreting. Y2 Everyday uses of materials Y1 Everyday materials
	insulator	A material that does not allow electricity or heat to pass	lux	Unit of measure for light	
	Thermal conductor	To be able to transfer, or conduct, heat.	mixture	A combination of two or more substances that can be separated.	
	insoluble	Unable to be dissolved in a solvent to form a solution.	soluble	To be able to dissolve in a solvent to form a solution.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. Introduction	Children revisit prior learning that different materials have different properties.	Pupils understand that materials' properties makes them suitable for specific purposes.
2. Testing Properties (E1)	A material's properties dictate what it can be used for. For example, cooking pans are made from metal, which is a good thermal conductor, allowing heat to quickly transfer from the hob to the contents of the pan. Materials can be grouped according to their basic physical properties. Properties include hardness, solubility, transparency, conductivity (electrical and thermal) and magnetism.	Describe, using evidence from comparative or fair tests, why a material has been chosen for a specific use, including metals, wood and glass.
3. What is thermal Conductivity? (E2)	Thermal conductors conduct heat. Solid metals are good thermal conductors because their particles are closely packed and they have strong, lattice metallic bonds. Solids, such as plastic, wood and glass do not have these bonds so they do not conduct heat. They are thermal insulators. Liquids and gases are poor conductors of heat because their particles are further apart.	Within a group, decide which observations to make, when and for how long, and make systematic and careful observations, using them to make comparisons, identify changes, classify and make links between cause and effect.
4. Measure change in temp (E3) OPTIONAL but good maths links	Specialised equipment is used to take measurements in standard units. Examples include data loggers plus sensors, such as light (lux), sound (dB) and temperature (°C); timers (seconds, minutes and hours); thermometers (°C), and measuring tapes (millimetres, centimetres, metres).	Take increasingly accurate measurements in standard units, using a range of chosen equipment.
5. Testing thermal insulators (E4a+4b)	Some materials are better insulators than others—investigate to find out which are better & why?	Gather and record data and results of increasing complexity, selecting from a range of methods (scientific diagrams, labels, classification keys, tables, graphs and models).
6. Solubility (E5)	Solubility is a measure of a material's ability to dissolve in a solvent. A material is soluble if it can dissolve in a solvent to form a solution. A material is insoluble if it cannot be dissolved in a solvent to form a solution. Dissolving is when a solute becomes incorporated into a solvent and can no longer be seen.	Explain, following observation, that some substances (solutes) will dissolve in liquid (solvents) to form a solution and the solute can be recovered by evaporating off the solvent.
7. How can we separate mixtures? (D1 and 2)	Children learn that mixtures are two separate substances that are joined but can be separated back. Some mixtures can be separated by hand and some by sieving and some by filtering. Children carry out simple investigations looking at how to separate mixtures. They use filter paper to separate a mixture of muddy water (filtration investigation).	To plan different types of scientific enquiries to answer questions.
8.How can we separate mixtures that have dissolved? (D3a)	Children carry out a simple investigation using coffee to help them understand that materials which have dissolved need to be separated using evaporation.	To plan different types of scientific enquiries to answer questions
9. Reversible and irreversible changes (D2 L1)	Children learn that some changes are reversible e.g. cooling, heating, melting, dissolving and evaporating. Some changes are irreversible e.g. burning, rusting, decaying and chemical reactions, where a new materials is made.	To classify and sort changes.
10. Review and Assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes				Diversity in the Curriculum
Working Scientifically	Children understand the complexity of materials and how there are different ways to separate them ranging from sieving to filtration to evaporation. They use different pieces of scientific equipment (filter paper, beakers) etc to separate mixtures.			Percy Julien—famous black chemist who created a new substance.
Properties and changes of materials.	Children learn that materials are suited to their properties and that there are useful to everyday life in the form of insulating and conducting heat, creating new materials through changes.			
Outcome	Character Traits	Stickability	WOW	
L8—Apply learning to ancient Greek wine, which was mixed with salty seawater. How are we going to separate the salt and the 'wine'?	Curiosity Ambitious	First hand knowledge through practical activities & investigations	Carrying out sieving and filtration investigations.	

Y6 Science - The Circulatory System

(Animals incl. humans) Y6 *(History—Maafa)*

Curriculum Objectives	Vocabulary—links with Animals and other humans				Links Across the Curriculum
- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood - recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function - describe the ways in which nutrients and water are transported within animals, including humans	Aorta	The largest artery in the body	Circulatory system	All body parts that work together to move blood around the body.	PSHE—Lifestyle choices can have a positive (exercise and eating healthily) or negative (drugs, smoking and alcohol) impact on the body. Well-being—Know the benefits of physical exercise, time outdoors, community participation, voluntary and service-based activity on mental wellbeing and happiness. Art—represent arteries using drawing and labels DT—Model making (usually set as homework) + Y3 Skeletal system
	blood	A liquid made up of red & white blood cells, plasma & platelets.	Heart rate	The number of times the heart beats per minute.	
	artery	blood vessel that carries blood from the heart to other parts of the body.	Aerobic exercise	An exercise that requires the heart to pump more oxygenated blood to working muscles.	
	Blood vessel	flexible tube that transports blood around the body.	heart	muscular organ that pumps blood around the body.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. Role of the circulatory system	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.	Name and describe the purpose of the circulatory system and the functions of the heart, blood vessels and blood.
2. Structure & function of the heart	Children know that the heart is an muscular organ that pumps blood around the body. They name the parts of the heart, describe/explain the functions.	When the heart beats, the valves open to allow blood to flow in one direction. They then close completely to preventing any blood leaking backwards.
3. The function of blood	Blood is made up of four different components: plasma, platelets, red blood cells and white blood cells. Children make a representative blood sample.	Explain that the circulatory system in animals transports oxygen, water and nutrients around the body.
4. Structure & function of blood vessels	The heart pumps blood through the blood vessels and around the body. There are three types of blood vessel: arteries, veins and capillaries. They each have a different-sized hole (lumen) and walls.	Name and describe the purpose of the circulatory system and the functions of the heart, blood vessels and blood.
5. Measure heart rate	The resting heart rate is the number of times a heart beats per minute when a person is at rest. The heart rate can be measured by recording the pulse at different points of the body. A heart rate monitor can also be used to measure the pulse.	Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
6. Proving a hypothesis	Prove/disprove the hypothesis ' Children with lower resting heart rates can sprint faster than those with higher resting heart rates.' Carry out investigation.	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
7. Heart rate investigation	Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Recognise different types of exercise. Plan an investigation.	Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
8. Classifying foods	Know what constitutes a healthy diet (including understanding calories and other nutritional content by examining food packaging). Recap & discuss the Eatwell diagram.	Sorting groups of food into various categories according to content (sugar, saturated fat, salt, etc.)
9. Recognise impact of drugs & alcohol on the way bodies function	Describe the impact of drugs, alcohol & smoking on the circulatory system & know the facts about legal & illegal harmful substances & associated risks.	Explain the impact of positive and negative lifestyle choices on the body.
10. Review & assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes				Diversity in the Curriculum
Working Scientifically	Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.			Otis F Boykin—invented the pacemaker.
Animals incl Humans	Children build on understanding of how the body works and specifically how the heart works and in doing so further their knowledge of how to live a healthy life.			
Outcome	Character Traits	Stickability	WOW	
Children create a piece of healthy packaging based on their research.	Articulate Curious	Oracy—importance of the blood Working wall	Heart rate investigations.	

Y6 Science - Living things & their habitats *(Frozen Kingdoms—Geography)*

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. - give reasons for classifying plants and animals based on specific characteristics.	Classification key	A series of questions that determine an organism's physical characteristics.	characteristic	A feature of something or someone	Geography—Arctic/Antarctic climate & animals. Embedded within Frozen Kingdoms unit. Eco-Schools—climate change English—Information text about an Arctic animal Builds on work from Y2, Y4, Y5.
	Thermal insulator	Material that inhibits transfer of heat	reptile	an animal that has cold blood, lays eggs, and that has a body covered with scales	
	species	a group of organisms that can reproduce with one another in nature and produce fertile offspring.	mammal	Warm-blooded vertebrate animal	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. Classification (Frozen Kingdoms, D1, L1)	Revisit prior learning on classification keys. Children understand that things are classified in terms of observable features. Research unfamiliar animals and plants from a range of habitats, deciding upon and explaining where they belong in the classification system.	To classify living things (microorganisms, animals & plants) into groups according to common observable characteristics/ similarities & differences.
2. Classification keys.	Children learn to use a key and observational skills to identify animals & use animal picture cards to create their own classification tree based on observed features. They give reasons for their classifications.	To use and construct classification systems to identify animals and plants from a range of habitats
3. How are animals adapted to their surroundings?	Children learn that an adaptation is a physical or behavioural trait that allows a living thing to survive and fill an ecological niche. They understand that adaptations evolve by natural selection.	To identify how animals and plants are adapted to suit their environment and that adaptations may lead to evolution.
4. Polar adaptations	Children understand different cold climate adaptations and investigate the adaptation of blubber as a thermal insulator.	To ask and answer deeper and broader scientific questions about the local and wider world that build on and extend their own and others' experiences & knowledge.
5. Investigating icebergs (D2, L5)	Make observations and investigate to find out what factors change the rate at which an 'iceberg' melts.	To plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
6. Review & assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum
Working Scientifically	Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	Rachel Carson—pioneering work on the detrimental effect of pesticides.
Living things and their habitats.	Children understand more about the wider world around them, about the climate and the wonder of animals and plants that survive in different environments. They have a wider respect for looking after our environment.	

Outcome	Character Traits	Stickability	WOW
Oracy report on how to prevent ice melting.	Articulate curious	Oracy presentations Present research findings	Investigate blubber using animal fat

Y6 Science - Electrical circuits and Conductors (Geography—Frozen Kingdoms)

Curriculum Objectives	Vocabulary—build on vocabulary from Y4.				Links Across the Curriculum
- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit - compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches - use recognised symbols when representing a simple circuit in a diagram	appliance	A piece of electrical equipment used in the home.	circuit	A collection of components connected by wires through which electricity can flow	PSHE—keeping safe around electricity DT Engineer unit —design & create a game involving a circuit Builds on Y4 Electricity.
	battery	A number of cells connected together	component	A device added to an electrical circuit	
	buzzer	A component that makes a sound	conductor	A material through which an electrical current can flow	
	cell	A store of chemical energy that can be converted to electrical energy	Electric current	The flow of electric charge through a circuit	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. Naming circuit components (intro) & recognise circuit symbols (E1)	Children recall prior learning from lower KS2 (+ Y4) about simple series circuits and their components. Use recognised symbols when representing a simple circuit in a diagram.	To create circuits using a range of components and record diagrammatically using the recognised symbols for electrical components.
2. Recording circuits (E2)	Children learn to use recognised symbols when representing a simple circuit in a diagram.	To create circuits using a range of components and record diagrammatically using the recognised symbols for electrical components.
3. Exploring circuit components (E3)	Children compare and give reasons for variations in how components function, including brightness of bulbs, loudness of buzzers & on/off position of switches.	To generate questions that could be tested using the circuit components, e.g. 'What will happen to the buzzer volume if I increase the length of the wires?
4. Voltage & cells (D1)	Children learn electric current is measured using an ammeter. The force that pushes electric charge around a circuit, called the voltage, is measured using a voltmeter. They understand a multimeter measures both electric current and voltage.	To use specialised equipment is used to take accurate measurements in std units.
5. Research batteries & cells (D2)	Could be HOMEWORK. Children to think of questions about cells and batteries that they could answer through research.	To ask & answer deeper & broader scientific questions about the local & wider world that build on & extend their own & others' experiences & knowledge.
6. Investigate voltage (D3)	Children explain how the brightness of a lamp or volume of a buzzer is affected by the number and voltage of cells used in a circuit.	To carry out fair testing using a range of equipment
7. Create a circuit in a game/quiz	Children design a game/quiz that involves matching a question to the right answer where the circuit is completed illuminating a bulb/sounding a buzzer.	To apply knowledge, constructing a circuit in a game.
8. Review & assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum	
<i>Working Scientifically</i>	Research through secondary sources.	Granville T. Woods was a prolific inventor. He had 150 patents, and 35 of them are in the field of electricity and electromagnets	
<i>Physics</i>	Test electrical circuits using a range of electrical components.		
<i>Chemistry</i>	How chemicals are use in a cell / batteries .		
Outcome	Character Traits	Stickability	WOW
Children create a game and explain it through oracy skills.	Articulate curious	Homework Practical learning	Design & make a game / quiz using an electrical circuit

Y6 Science - Light theory *(History—Britain at War)*

Curriculum Objectives	Vocabulary—build on vocabulary from Y3 Light topic.				Links Across the Curriculum
- recognise that light appears to travel in straight lines - use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye - explain that we see things because light travels from light sources to our eyes or from light sources to objects & then to our eyes - use the idea that light travels in straight lines to explain	Light source	Something that produces light.	Lux	A unit of measurement for light intensity.	Art—drawing diagrams to represent science models Frozen Kingdoms—Arctic & Antarctic sun/day/night. Light reflecting/diffusing off the ice sheets History—creating a periscope for a submarine. Build on from Y3 Light.
	beam	A group of light rays that move in the same direction	prism	A transparent block of glass or plastic that separates white light into a visible spectrum of colours	
	Concave	A surface that curves inwards	ray	A narrow beam of light	
	convex	A surface that curves outwards	refract	The bending of light as it passes from one transparent medium to another	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. recap prior learning + how does light travel? (Eng.1)	Recognise that light appears to travel in straight lines	record observations on how the investigations prove light travels in straight lines.
2. How do we see? (Eng.2)	Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.	record accurate results, including scientific diagrams & labels
3. Visible light (Eng.3)	The electromagnetic spectrum includes visible light that humans can see and light that humans cannot see. Visible light is made up of coloured light that when mixed makes white light.	Explain that, due to how light travels, we can see things because they give out or reflect light into the eye
4. Colour perception (Eng.4)	Cones in the retina that are sensitive to red, green and blue light help us to see different colours. When different combinations of cones are stimulated, we see different colours.	Report on and validate their findings, answer questions and justify their methods, opinions and conclusions
5. Shadows (Dev.1)	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them	Explain, using words, diagrams or a model, why shadows have the same shape as the objects that cast them & how shadows can be changed
6. Reflections (Dev.2)	Plane mirrors are flat, concave mirrors curve inwards & convex mirrors curve outwards. Plane mirror reflections are the same size, & the right way up but they are reversed. Concave mirrors enlarge the image & concentrate the rays of light into a focal point. Convex mirrors make images smaller & disperse light which reflects a wider view	Describe, using diagrams, how light behaves when reflected off a mirror (plane, convex or concave) and when passing through a lens (concave or convex)
7. Measuring light (Dev.3)	Fair testing to investigate light reflecting off different coloured paper & record results. White surface will reflect all the light. Coloured surface will only reflect the colour of the surface.	Take accurate, precise and repeated measurements in standard units, using a range of chosen equipment
8. Refraction (Dev.4)	Refraction is the bending of light as it passes from one transparent material to another. Refracted light creates a visible spectrum when white light shines through a prism or raindrops. The human eye depends on refraction to see.	Describe, using scientific language, phenomena associated with refraction of light
9. Review & assess	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum
<i>Working Scientifically</i>	Fair testing.	Build on learning of how other cultures and societies view light, the sun and have used it in history e.g. ,Mayan and Inca culture. Roman sundials.
<i>Light</i>	Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.	

Outcome	Character Traits	Stickability	WOW
Create a periscope, much like WW2 subma- rines.	Resilience	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	What's inside an eye ball—lesson 2 Youtube link

Y6 Science - Evolution & inheritance

(History—Britain at War)

Curriculum Objectives	Vocabulary				Links Across the Curriculum
- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago - recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents - identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution	adaptation	A physical/behavioural characteristic that allows a living thing to	fossil	The remains or traces of once-living things preserved as rock.	Frozen Kingdoms—plants & animal adaptations
	Artificial selection	A process in which humans breed animals and plants with desirable characteristics.	gene	A small section of DNA that acts as instructions for a specific inherited characteristic, such as eye colour	
	evolve	To change gradually over a long period of time.	origin	The beginning of something.	

Lessons Sequence	Substantive Knowledge / Key Knowledge	Disciplinary Knowledge / Skills
1. Revisit./recap prior learning + Classifying fossils (Eng.1)	Children learn there are five kingdoms: animals, plants, fungi, protists and monerans. Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago	Explain that living things have changed over time, using specific examples and evidence
2. Theory of evolution (Eng.2)	Children understand how scientists compare fossilised remains from the past to living species that exist today to hypothesise how living things have evolved over time.	To identify scientific evidence that has been used to support or refute ideas or arguments
3. Inheritance (Dev.1)	Children learn that inheritance is when living things pass on characteristics following sexual reproduction, such as height, skin colour and eye colour. Variation is the natural differences in characteristics between individuals of the same species.	Identify that living things produce offspring of the same kind, although the offspring are not identical to either parent
4. Natural selection & survival of the fittest (Dev.2)	Children learn to identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Identify how animals and plants are adapted to suit their environment and that adaptations may lead to evolution.
5. Exploring plant adaptations	Children learn there are three different types of plant adaptations: structural, behavioural and chemical.	To report findings from enquiries.
6. Artificial selection	Children learn animals and plants can be bred to produce offspring with specific and desired characteristics. This is called selective breeding. Examples include cows that produce large quantities of milk or crops that are disease-resistant.	Describe how animals and plants can be bred to produce offspring with specific and desired characteristics (selective breeding).
7. Review & assess.	Children review and summarise their learning from data gathered. They complete the online google quiz.	

Themes		Diversity in the Curriculum
Research	Children learn it is important to evaluate evidence from a range of sources and to draw conclusions based on scientific fact. They consider how past research has supported our understanding of evolution today.	Jane Goodall Mary Leaky, Barbara McClintock - Three female pioneering scientists in the theory of evolution.
Making observations	Understand that scientific evidence can be observed or tested.	

Outcome	Character Traits	Stickability	WOW
Children to apply their learning to their art topic through study of a butterfly and it's adaptive features.	Resilience curiosity	Flash cards, mini quiz (round the world), wow moments, oracy opportunities, mantle of the expert, working wall, acting out concepts, google forms.	What's inside an eye ball—lesson 2 Youtube link