St. Mary's - Science Curriculum - Knowledge Map

***Questions relate to these key concepts that underpin all scientific enquiry, developed through regular re-visiting in a range of contexts:**

Work likely in …	Early Years	KS1	Lower KS2	Upper KS2
Working Scientifically	Pupils should be taught to explore, create and think critically through: • Exploring and questioning the world around them, making observations and drawing pictures of animals and plants. • Planning tasks and changing strategies when needed • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	Pupils should be taught to use practical scientific methods, processes and skills. These are: • Asking simple questions and answering them in different ways • Observing closely, using simple equipment • Performing simple tests • Identifying and classifying • Using observations and ideas to suggest answers to questions • Gathering and recording data to help answer questions	Pupils should be taught to use practical scientific methods, processes and skills. These are: • Asking relevant questions and use different types of scientific enquiries to answer them. • Setting up practical enquiries, comparative and fair tests • Make systematic and careful observations and where appropriate take accurate measurements using a range of equipment, including thermometers and data loggers. • Gathering, recording, classifying and presenting data in different ways to help in answering questions • Use simple scientific language to record findings with drawings, labelled diagrams, keys, bar charts, tables and line graphs. • Report on findings using oral and written explanations, displays or presentations for results and conclusions • Use the results to draw simple conclusions, make predictions and suggest improvements and raise further questions • Identifying differences, similarities or changes related to simple scientific ideas and processes • Using straightforward scientific evidence to answer questions or support findings	Pupils should be taught to use practical scientific methods, processes and skills. These are: • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables • Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when necessary • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • Using results to make predictions to set up further comparative and fair tests • Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. • Identifying scientific evidence that has been used to support or refute ideas,

Explanatory note A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome. A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.

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Procedural Knowledge. What is the procedural knowledge for each phase? Questioning, investigating, recording				
	EYFS/FS	KS1	LKS2	UPKS2
Asking questions and making predictions	**Play, Observe, Ask** Ask questions to solve a problem, clarify a concept, evaluate an activity or extend a narrative	• 1) Ask simple questions e.g- What something is -How things are similar/different change where appropriate, answer these questions. • 2) Answer questions developed with the teacher often through a scenario. • 3) Be involved in planning how to use resources to answer questions using different enquiry types.	•1) Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. •2) Answer questions posed by the teacher. •3) With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • 3) Decide the type of enquiry.	• 1) Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • 2) Using a wide range of resources decide for themselves how to gather evidence to answer a scientific question. • 3) Choose a type of enquiry to carry out and justify their choice.
Observing Taking Measurements	**I See, I Notice, I Wonder** Provide stimulus that can create narratives. Three step process.	• 1) Make careful observations to support identification, comparison and notice change. • 1) Use senses, aided by equipment such as magnifying glasses or digital microscopes, to make observations. • 2) Begin to take measurements, initially by comparisons, then using non-standard units.	• 1) Make systematic and careful observations. • 2) Use a range of equipment and thermometers and data loggers for measuring length, time, temperature and capacity using standard units.	• 1) Make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value). • 2) Select measuring equipment and thermometers and data loggers to give the most precise results e.g. ruler, tape, measure or trundle wheel, force meter with a suitable scale.
Engage in practical enquiry to answer questions.	**Encouraging Independent Exploration** Enhanced provision where children can make predictions, test out their science ideas and explore independently.	•**1)** Use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. •Carry out tests to classify; compare; pattern seek; enquire and make observations over time. •Sort and group (to compare) objects, materials, living things, identifying their own criteria for sorting. •Use simple secondary sources to name living things and answer questions. •Describe the characteristics they used to identify a living thing.	• **1)** Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • **2)** Follow their plan to carry out/support children to make: -observations and tests to classify; -comparative and simple fair tests; -observations over time - pattern seeking.	• **1)** Independently select from a range of practical resources to gather evidence to answer their questions. • **2)** Independently; -carry out fair and comparative tests, recognising and controlling variables. -decide what observations or measurements to make over time and for how long. – -look for patterns and relationships using a suitable sample
Recording and presenting evidence	**Developing Talk** Model effective oracy, speaking and listening Introduce key vocabulary and responding respectfully to all contributions.	• 2) Record their observations using photographs, videos, drawings, labelled diagrams or in writing. • 3) Record their measurements using prepared tables, pictograms, tally charts and block graphs. •4) Classify using simple prepared tables and sorting rings (Venn diagrams).	• 1) With support decide how to record and present evidence. • 2) Record observations using photographs, videos, pictures, labelled diagrams or writing. • 3) Record their measurements using tables, tally charts and bar charts (given templates, if required, to which they can add headings). • 4) Record classifications using tables, Venn diagrams, Carroll diagrams.	•1) With increasing independence decide how to record and present evidence. • 2) Record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. •3) Record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. •4) Record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys.
Answering Questions and Concluding	**Developing Talk** Building on observations of scientific enquiry through questioning and modelling.	• 1) Use their experiences of the world around them to suggest appropriate answers to questions. •Support to relate experiences to evidence e.g. observations they have made, measurements, information gained from secondary sources. •Using observations and ideas suggest answers to questions.	•1) Answer their own and others' questions based on observations, measurements or secondary sources ensuring the answers are consistent with the evidence. • Interpret data/findings to generate simple comparative statements based on evidence (similarities and differences). •Begin to identify naturally occurring patterns and causal relationships. •Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.	• 1) Answer their own and others' questions based on observations, measurements or information gained from secondary sources ensuring answers are consistent with evidence. •Discuss whether other evidence e.g. from other groups, secondary sources and scientific understanding, supports or refutes answers. • Talk about how scientific ideas change due to new evidence gathered. • In conclusions: identify causal relationships; patterns in the natural world from evidence; identify results that do not fit the overall pattern; explain findings using subject knowledge.
Evaluating and raising further questions and predictions			• Identify ways in which they complete enquires differently. • Use evidence to suggest values for different items tested using the same method e.g. distance travelled by a car on an additional surface. • Following a scientific experience, ask further questions which can be answered by extending the same enquiry.	• Evaluate the choice of method used, the control of variables, the precision and accuracy of measurements or the credibility of secondary sources used. • Identify any limitations that reduce the trust they have in their data. • Use the test results/scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.
Communicating their findings			• Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary.	• Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations using relevant scientific language and vocabulary.

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Scientific vocabulary	look closely, observe, watch, touch, feel, smell, listen, same, different, compare, ask questions, record, sort, group	observe, changes, patterns, grouping, sorting, compare, same, different, identify (name), measure, data, record results, table, tally chart, present, pictogram, Venn diagram, scatter graph, ask questions, test, investigate, explore, equipment, resources, answer questions, interpret results, scientific enquiry, pattern seeking, comparative testing, observing over time, classifying, researching using secondary sources practical work, fair testing, relationships, accurate, thermometer, data logger, stopwatch, timer, estimate, data, diagram, identification key, chart, bar chart, prediction, similarity, difference, evidence, information, findings, criteria, values, properties, characteristics, conclusion, explanation, reason, evaluate, improve variables, independent variable, dependent variable, control variable, evidence, justify, causal relationship, accuracy, precision, bar graphs, line graphs, force meter

EYFS	Vocabulary	Find out (Observe)	Try it out/Test (Explore/investigate)	What do we know/did we find out? (Record/conclude)	Substantive Knowledge	Independent work opportunities and writing like a scientist
Understanding the World **All about me** **The Seasons (ongoing through out the year)**	**plants change, chrysalis, seed, fruit, grow** **melt, freeze, ice,** **egg, caterpillar, butterfly, frog, tadpole** **Metal, wood, tin, plastic, cardboard, paper**	**Observe the fruits that have grown over the Summer on our fruit trees (observation over time)** • Provide stimulus that can create narratives. Three step process. **Making pumpkin soup** • Provide stimulus that can create narratives. Three step process. **Freezing and melting-ice (observation over time)** • Ask questions to solve a problem, clarify a concept, evaluate an activity or extend a narrative • Provide stimulus that can create narratives. Three step process. **Planting seeds and observing them grow (observation over time)**	**Seasonal walks and exploring autumnal treasures (observation over time)** • Enhanced provision where children can make predictions, test out their science ideas and explore independently. **Freezing and melting-ice (observation over time)** • Enhanced provision where children can make predictions, test out their science ideas and explore independently.	**Seasonal walks (observation over time)** • Model effective oracy, speaking and listening Introduce key vocabulary and responding respectfully to all contributions. **Support vocabulary related to the similarities and differences in children and their families** • Model effective oracy, speaking and listening Introduce key vocabulary and responding respectfully to all contributions. **Freezing and melting- ice (observation over time)** • Model effective oracy, speaking and listening Introduce key vocabulary and responding respectfully to all contributions. • Building on observations of scientific enquiry • through questioning and modelling. **Discuss what we can see as we observe our growing seeds/plants (observation over time)**	**Nursey** • Talk about the differences between materials and changes they notice. • Explore and talk about different forces they can feel. • Explore how things work • Understand the key features of the life cycle of a plant and an animal. Begin to understand the need to respect and care for the natural environment and all living things. **Reception** • Explore the natural world around them. Recognise some similarities and differences between life in this country and life in other countries • Describe what they see, hear and feel whilst outside. • Recognise some environments that are different from the one in which they live.	**LF** opportunities within provision will include: • **Collage materials** • **Magnets and loose parts** • **Tadpoles and butterflies** • **Plants in the investigation area.** • **baking** UF opportunities within provision will include: • **Collage materials/workshop area** • **Tadpoles and butterflies** • baking

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Our Frozen planet **(Living Things) Materials**		• Provide stimulus that can create narratives. Three step process. **The life cycle of a butterfly and a frog (observation over time)** • Provide stimulus that can create narratives. Three step process. **Traditional stories-Design a boat using a selection of materials (observation over time)** • Provide stimulus that can create narratives. Three step process.	**Exploring growing seeds/plants talking about what they need to help them grow. (observation over time)** • Enhanced provision where children can make predictions, test out their science ideas and explore independently. **Traditional stories-Explore different materials to create the three pigs house (observation over time)** • Enhanced provision where children can make predictions, test out their science ideas and explore independently.	• Model effective oracy, speaking and listening Introduce key vocabulary and responding respectfully to all contributions. • Building on observations of scientific enquiry through questioning and modelling. **Lifecycle of a butterfly and a frog. Talk about the changes they see from caterpillar to butterfly and a frog. (observation over time)** Model effective oracy, speaking and listening -Introduce key vocabulary and responding respectfully to all contributions. Building on observations of scientific enquiry through questioning and modelling. **Traditional stories -Testing materials (observation over time)** • Building on observations of scientific enquiry through questioning and modelling.	• 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.	UF opportunities within provision will include • **Exploring materials**
Year 1	**Vocabulary**	**Find out (Observe)**	**Try it out/Test (Explore/investigate)**	**What do we know/did we find out? (Record/conclude)**	**Substantive Knowledge**	**Independent work opportunities and writing like a scientist**
Plants **Spring 1**	nutrients, flower, survive	**Cress Seed Planting (observations over time)** •Ask simple questions e.g- What something is -How things are similar/different change where appropriate, answer these questions. •Answer questions developed by the teacher. •Make careful observations to notice changes. •Use senses, aided by equipment such as magnifying glasses to make observations of the cress.	**Cress Seed Planting (observations over time)** •Use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. •Carry out tests to make observations over time.	**Cress Seed Planting (observations over time)** •Record their observations using photographs and drawings. •Use their experiences of the world around them to suggest appropriate answers to questions. •Using observations and ideas suggest answers to questions. •Record observations using the labelled diagram	• Know that a seed contains a miniature plant that can develop into a fully-grown plant. • Explain that a bulb has underground vertical shoots which already has modified leaves. • Identify that seeds and bulbs need water to grow but most do not need light (germination). • Know that seeds and bulbs have food stores inside them to help the plant start to grow. • Know the difference between deciduous and evergreen trees. • Explain that to survive plants, need to get water, light, and avoid being eaten.	**Independent work opportunities:** Record their observations of cress growing using photographs and drawings. **Writing like a scientist:** Predict write a prediction of what they think will happen to the cress.

					Explain that seed produces roots to allow water to get into the plant. • Explain that seed produces shoots to produce leaves to collect the sunlight. • Know that a basic plant structure can include leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem.	
Animals including humans **Autumn 2**	Animal Mammals Reptiles Amphibians Birds Carnivore Herbivores Omnivores	**Do all animals eat the same food (investigation)? (pattern seeking)** •Ask simple questions / Answer questions developed with the teacher often through a scenario. •Be involved in planning how to use resources to answer questions using different enquiry types. •Make careful observations to support identification, comparison and notice change. **What do our senses do(investigation)? (comparative testing)** • Answer questions developed with the teacher often through a scenario. **Which group does an animal belong to? (classifying)** •Use senses, aided by equipment such as magnifying glasses or digital microscopes, to make observations.	**Do all animals eat the same food (investigation)? (pattern seeking)** •Use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. •Carry out tests to pattern seek **What do our senses do(investigation)? (comparative testing)** •Use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. •Carry out tests to compare **Which group does an animal belong to? (classifying)** •Use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. •Carry out tests to classify. •Sort and group (to compare), living things, identifying their own criteria for sorting. •Use simple secondary sources to name living things and answer questions. •Describe the characteristics they used to identify a living thing.	**Do all animals eat the same food (investigation)? (pattern seeking)** •Using observations and ideas suggest answers to questions. •Use their experiences of the world around them to suggest appropriate answers to questions. Record their measurements using prepared tables **What do our senses do(investigation)? (comparative testing)** Using observations and ideas suggest answers to questions. Use their experiences of the world around them to suggest appropriate answers to questions. **Which group does an animal belong to? (classifying)** Record their observations using photographs Record their measurements using prepared tables, classify using simple prepared tables and sorting rings (Venn diagrams).	• Identify that animals are groups of organisms that need to consume food to survive. • Know that food provides energy and the building blocks of growth. • Identify that there are many different groups of animals including fish, amphibians, reptiles, birds and mammals. They have different structures, and they eat different types of foods. • Describe and compare the structure of a variety of common animals varies. Mammals have hair/fur and give birth to live young, fish can breathe underwater using gills, birds have feathers, beaks and wings. Females lay eggs. Most birds can fly, reptiles are air breathing and have scaly skin and lays eggs, and amphibians have smooth slimy skin and live on land and in water. • Explain that some eat other animals (carnivores), and others only eat vegetables (herbivores), and some like to eat both plants and meat (omnivores). • Identify common animals that are carnivores include lions, cats, sharks and snakes. • Identify common animals that are herbivores include cows, horses, sheep, elephants and deer. • Identify common animals that are omnivores include humans, bears, monkeys and seagulls. • Animals must move to get their food.	Independent work opportunities: Classify animals using photographs into sorting rings – carnivore, omnivore and herbivore Writing as a scientist: Conclude their findings from classifying animals in different categories

					• They will move in different ways to get their food. • Animals that eat other animals are called predators. • Animals that are eaten by other animals are called prey. • Animals feeding relationships can be illustrated in a food chain. • Know the five sensory organs are the eyes (for seeing), nose (for smelling), ears (for hearing), tongue (for tasting), and skin (for touching or feeling). • Know that animals have senses to help them survive. • Know that animals have developed a range of ways to find prey or avoid being eaten .	
Everyday Materials **Summer 2**	**hard** **soft** **stretchy** **stiff** **shiny** **dull** **rough** **smooth** **bendy** **not bendy**	• Make careful observations to support identification • Ask simple questions e.g- What something is -How things are similar/different change where appropriate, answer these questions. •	• Materials investigation: test out the different materials to find out their properties: Wood, fabric, metal, plastic, glass, metal, rock, water, brick, elastic, rubber, foil •Use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. •Carry out tests to classify objects into their material properties. •Sort and group identifying their own criteria for sorting.	• 2) Record their observations using photographs, videos, drawings, labelled diagrams or in writing. •4) Classify using simple prepared tables and sorting rings (Venn diagrams)- compare and group wood, fabric, metal, plastic, glass, metal, rock, water, brick, elastic, rubber and foil	**Knowledge Block 1 – What is the big idea about materials?** • Identify that there are different materials that have different observable properties. Wood, fabric, metal, plastic, glass, metal, rock, water, brick, elastic, rubber, foil • Describe the properties of wood, fabric, metal, plastic, glass, metal, rock, water, brick, elastic, rubber, foil • Compare and group, wood, fabric, metal, plastic, glass, metal, rock, water, brick, elastic, rubber, foil	Independent work opportunities: Group/ compare objects into the material they are made from Writing as a scientist: Explain the different properties of materials
Seasonal Changes **Ongoing through out the year.**	Seasons, Spring, Summer, Autumn, Winter, earlier, later, longer, shorter, evergreen,	**Weather Watching Winter and Summer (pattern seeking)** • Be involved in planning how to use resources to answer questions using different enquiry types. • Make careful observations to support identification, comparison and notice change. •Begin to take measurements, initially by using thermometers. **Hamilton trust weather watching**	**Weather Watching Winter and Summer (pattern seeking)** •Use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. •Carry out tests to pattern seek	**Weather Watching Winter and Summer (pattern seeking)** • Record their observations using photographs, videos, drawings, labelled diagrams or in writing. •Using observations and ideas suggest answers to questions.	• Know there are four seasons, Spring, Summer, Autumn and Winter • Explain that each season is approximately three months long. • In Autumn, explain that the leaves fall off the trees. • In Spring, explain that young animals like lambs and chicks are born, the flowers bloom and the weather start to become warmer.	Independent work opportunities: Record their measurements using a prepared pictogram for how many hours the sun is out in the different seasons. Writing as a scientist:

		Rainfall Weather Station; Spring to Summer (observation over time) • Answer questions developed with the teacher often through a scenario. • Be involved in planning how to use resources to answer questions using different enquiry types. • Make careful observations to support identification, comparison and notice change. • Begin to take measurements, initially by comparisons, then using non-standard units. **Hamilton trust Weather stations** **Shadow Fun; Summer (observations over time and comparisons)** • Ask simple questions e.g- What something is -How things are similar/different change where appropriate, answer these questions. • Begin to take measurements, initially by comparisons, then using standard units (cms). **Hamilton Trust Shadow Fun**	**Rainfall Weather Station; Spring to Summer (observation over time)** •Carry out tests to make observations over time. **Shadow Fun; Summer (observations over time and comparisons)** • Carry out tests to compare and make observations over time.	**Rainfall Weather Station; Spring to Summer (observation over time)** • Record their measurements using prepared tables. •Support to relate experiences to evidence, observations they have made, measurements, • Recognise 'highest and lowest' 'most and least' from their data. **Shadow Fun; Summer (observations over time and comparisons)** • Record their observations using photographs, videos, drawings, labelled diagrams or in writing. • Use their experiences of the world around them to suggest appropriate answers to questions. •Support to relate experiences to evidences-observations they and measurements. • Recognise 'biggest and smallest', 'best and worst' etc. from their data.	• Explain that Winter, has the shortest daylight time and Summer has the longest daylight time. • Explain that Winter is the coldest season and Summer is the warmest season. • Explain seasonal differences such as rainfall between Spring and Summer. Spring is wetter than Summer. • Explain that in summer the trees are full of green leaves. • Explain that in Winter trees, apart from evergreen trees, are bare. • Identify that evergreen trees keep their green leaves all year round. Deciduous trees lose their leaves every autumn.	In Summer conclude their findings of the pictogram.
Year 2	**Vocabulary**	**Find out** **(Observe)**	**Try it out/Test** **(Explore/investigate)**	**What do we know/did we find out?** **(Record/conclude)**	**Substantive Knowledge**	**Independent work opportunities and writing like a scientist**
Living Things and Their Habitats **Autumn 2**	**food chain, producer, consumer, living, dead, never been alive, habitat, micro-habitat**	**Living Things Sorting Activity (Identify and Classify)** •Ask and answer simple questions developed with the teacher. •Make careful observations to support identification and comparisons of things that are living, dead, and never alive. **Microhabitat Hunt (Pattern Seek)** • Ask and answer simple questions developed with the teacher. •	**Living Things Sorting Activity (Identify and Classify)** •Use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. •Carry out tests to classify. •Sort and group (to compare) living things, identifying their own criteria for sorting. •Describe the characteristics they used to identify a living thing. **Microhabitat Hunt (Pattern Seeking)** • Support children to make observations and to pattern seek. -	**Living Things Sorting Activity (Identify and Classify)** • Using observations and ideas suggest answers to questions. • Use their experiences of the world around them to suggest appropriate answers to questions. • Record their measurements using prepared tables, classify using simple prepared tables and sorting rings/boxes. **Microhabitat Hunt (Pattern Seeking)** • Record their observations using photographs and drawings. • Record their observations using tally charts.	**Knowledge Block 1 - How do animals get their food?** ●Make comparison between things that are living, dead and have never been alive. ● Identify that habitats are places where animals and plants live (from Year 1) ●Identify that animals live in habitats in which they are suited. ● Explain that different kinds of animals and plants depend on each other within habitat. Know that insects have 6 legs and spiders have 8 legs and are different to insects. ● Animals get their food from plants and other animals. This can be shown in a food chain.	**Independent Writing Opportunities** Evaluate suited to their habitats. Writing Like a Scientist Identify/Classify Living Things into pre-determined tables using findings from sorting boxes. Write a conclusion based on observations and recordings.

					●Know that a food chain begins with a producer. This is often a green plant because plants can make their own food. ● Know that living this that eats other plants is called a consumer.	
Plants **Spring 2**	germination, reproduction, reproduction,	**Cress Growing Comparison (Observation Over Time)** • Observe and describe how seeds and bulbs grow into mature plants • Asking simple questions and answer questions developed with the teacher. • Be involved in planning how to use resources to use different enquiry types.	**Cress Growing Comparison (Observation Over Time)** • Carry out tests to classify; compare, enquire and make observations over time.	**Cress Growing Comparison (Observation Over Time)** • Record their observations using photographs, drawings, labelled diagrams or in writing. • Answer their own and others' questions based on observations, measurements or secondary sources ensuring the answers are consistent with the evidence. • Interpret data/findings to generate simple comparative statements based on evidence (similarities and differences). • Begin to identify naturally occurring patterns and causal relationships. • Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Scatter graph comparison	● Explain that all flowering plants make seeds (reproduction) that can grow (germinate) into new plants. ● Explain why plants need water, light and a suitable temperature to grow and stay healthy and what will happen if they do not have these things. ● Explain that some plants die after it has produced its seed and sometimes the plant lives for many generations producing seeds each year.	**Independent Writing Opportunities** Labelled diagram of a sprouting bean, functions of the seed and describing what a plant needs to grow. Writing as a Scientist Written prediction, method and conclusion for observation over time. Use real photos taken or sketches of method.
Animals, including humans **Summer 2**	**water, food, air, reproduce, adulthood, maturity**	**Afternoon Tea (Comparative Testing)** • Ask and answer simple questions developed with the teacher. • Be involved in planning how to use resources to answer questions using different enquiry types – classifying and identifying. **Human Life Cycle (Identify and Classify)** • Ask and answer simple questions developed with the teacher. • Make careful observations to support identification and comparisons of things that are living, dead, and never alive.	**Afternoon Tea (Comparative Testing)** • Carry out tests to classify which food belongs in which food group. • Sort and group (to compare) foods using the Food Pyramid. • Create an Afternoon Tea Plate containing correct amounts of each food group. **Human Life Cycle (Identify and Classify)** • Children to sort photos of themselves and their family members at different ages and describe what happens at each age. • Order the photographs to show progression – oldest to youngest.	**Afternoon Tea (Comparative Testing)** • Record their observations/comparisons using photographs and drawings. • Recognise the best and worst from their data linking to nutritional intakes. **Human Life Cycle (Identify and Classify)** • Record their observations using photographs and labelled diagrams. • Use their experiences of the world around them to suggest appropriate answers to questions. • Support to relate experiences to evidence observations they have made. • Using observations and ideas suggest answers to questions.	●Describe that animals and humans need water, food and air to survive. ●Explain that things that are living, move, feed, grow, reproduce and use their senses. ● Notice that animals and humans grow until they reach maturity and then don't grow any larger. ● Animals reproduce when they reach maturity (adulthood). ● Know that all animals eventually, die. ● Know that different animals live to different ages. ● Know that different animals reach different sizes before they are able to reproduce. ● Know that different animals reproduce at different ages. ● Know that animals, including humans, have offspring which grow into adults. ● Describe how exercise, eating the right amounts of different types of food and hygiene are important to maintain good health and wellbeing	**Writing Like a Scientist** Compare photographs of themselves/family members at different ages and describe differences and similarities. **Independent Writing Opportunities** Human Life Cycle – Accurately label stages in the human life cycle and explain what happens during each stage.

						Scatter Graph – Size of animal and Gestation Period Transcribe information from a table and conclude results.
Everyday Materials Spring 1	sustainability, recycle, waterproof, twist, squash, opaque, transparent, strong, weak, rigid, flexible	**Explore materials that can change shape when forces are exerted on them. (Comparative Testing)** • Consider prior knowledge when asking questions recapping materials using question stems and ideas: •Asking simple questions and answering them in different ways. •Make careful observations to support identification, comparison and notice change.	**Explore materials that can change shape when forces are exerted on them. (Comparative Testing)** Follow their plan to carry out: observations and tests to classify; compare and pattern seek. •Perform simple comparative testing of materials that can twist, stretch, bend and squash.	**Explore materials that can change shape when forces are exerted on them.** (Comparative Testing) •Decide how to record and present evidence (using tables). •Communicate findings to an audience orally and, using appropriate scientific vocabulary.	• Identify and compare the properties of wood, metal, plastic, glass, brick, rock, paper and cardboard and determine whether they are suitable for a purpose. • Explain that materials can be changed by physical force (twisting, bending, squashing and stretching). Activities within this learning journey should enable children to understand why we choose certain materials to do certain jobs. Children will plan how to test materials (wood, metal, plastic, glass, brick, paper, rock, cardboard).	**Writing Like a Scientist** Compare similarities and differences between different materials . **Independent Writing Opportunities** Record findings from the Changing Materials Investigation in a table/venn diagram drawn independently.
Year 3	**Vocabulary**	**Find out (Observe)**	**Try it out/Test (Explore/investigate)**	**What do we know/did we find out? (Record/conclude)**	**Substantive Knowledge**	**Independent work opportunities and writing like a scientist**
Plants Summer 1	**lifecycle, pollination, seed formation, seed dispersal**	**How is water transported within plants? (observation over time)** •Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. Answer questions posed by the teacher. •With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. •Decide the type of enquiry. •Make systematic and careful observations.	**How is water transported within plants? (observation over time)** •Select practical resources to gather evidence to answer questions generated by themselves or the teacher. •Follow their plan to carry out/support children to make observations over time.	**How is water transported within plants? (observation over time)** • With support decide how to record and present evidence. • Record observations using photographs, pictures and labelled diagrams. • Answer their own and others' questions based on observations • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary.	• Identify and describe the functions of different parts of flowering plants, roots/trunk, leaves, flowers and stem. • Know that a plant needs air, light, water, nutrients from the soil, room to grow for life and growth. • Compare and describe the effect of different factors on plant growth. • Understand that requirements for growth vary from plant to plant. • Describe the way in which water is transported in plants. • Explain the part that flowers play in the life cycle of flowering plants. • Understand pollination, seed formation and seed dispersal.	Labelled diagram – child drawn diagram with labels showing functions of different parts of a flowering plant Table – recording evidence of observations and measurements of plant growth over time Writing as a scientist – written question,

		What are the best conditions for plants to grow in? (observation over time) •Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. Answer questions posed by the teacher. •With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. •Decide the type of enquiry. •Make systematic and careful observations. •Use a range of equipment for measuring length using standard units.	**What are the best conditions for plants to grow in? (observation over time)** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to make observations over time.	**What are the best conditions for plants to grow in? (observation over time)** • With support decide how to record and present evidence. • Record their measurements using tables (given templates, if required, to which they can add headings). • Answer their own and others' questions based on observation and measurements ensuring the answers are consistent with the evidence. • Interpret data/findings to generate simple comparative statements based on evidence (similarities and differences). • Begin to identify naturally occurring patterns and causal relationships. • Use results to draw simple conclusions. • Identify ways in which they complete enquires differently. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary.		prediction and conclusion for 'best conditions for plant growth' investigation
Animals including Human Animals, Skeletons and Movement **Autumn 1**	**animals, humans, mammals, nutrition, balanced diet, skeleton, vertebrate, joint, muscle**	**Muscles and Movement-Do some people have stronger muscles because they use them more? (Pattern seeking enquiry)** • Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher. • With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. **Bone Growth Investigation (link to names of bones) – does length of bones change as we get older? (Pattern seeking enquiry)** • Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher.	**Muscles and Movement Investigation -Do some people have stronger muscles because they use them more? (Pattern seeking enquiry)** • Follow their plan to carry out/support children to pattern seek. **Bone Growth Investigation (link to names of bones) – does length of bones change as we get older? (Pattern seeking enquiry)** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to pattern seek.	**Muscles and Movement Investigation-Do some people have stronger muscles because they use them more? (Pattern seeking enquiry)** • With support decide how to record and present evidence. • Record their measurements using tables, pictograms and scatter graphs. • Begin to identify naturally occurring patterns and causal relationships. **Bone Growth Investigation (link to names of bones) – does length of bones change as we get older? (Pattern seeking enquiry)** • With support decide how to record and present evidence. • Record their measurements using tables and bar charts (given templates, if required, to which they can add headings). • Answer their own and others' questions based on measurements ensuring the answers are consistent with the evidence.	• Name parts of the skeleton. The skull, spine, collar, ribs, humerus, pelvis, femur, radius, ulnar. • Explain that skeletons are needed for support, protection and movement. • Define the main body parts associated with skeletons and muscles. • Explain that muscles are needed for support, protection and movement. • Describe the interaction between the skeleton and muscles. • Know that animals need the right types of nutrition, and that they get this from what they eat. • Name the main food groups with reference to the NHS Eatwell guide. • Define a balanced diet with reference to the NHS Eatwell guide. • Understand the different food groups and their importance with reference to the NHS Eatwell guide. • Explain what happens if you eat too much or too little of one food group or vitamin. •	Table – showing recorded measurements for length of forearm (ulna/ radius) and distance around skull for Y3 and Y6 pupils Bar chart – presenting results of measuring bone length Scatter graph – muscle and movement investigation Writing as a scientist – written question, prediction and conclusion for 'bone growth' investigation

		• With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. **Healthy diet/food groups – how much sugar (focus on one food group) is in our diet and what happens if we eat too much/too little? (Pattern seeking – survey)** • Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher. • Decide the type of enquiry.	**Healthy diet/food groups – how much sugar (focus on one food group) is in our diet and what happens if we eat too much/too little? (Pattern seeking – survey)** • Follow their plan to carry out/support children to make to seek pattern.	• Interpret data/findings to generate simple comparative statements based on evidence (similarities and differences). • Use results to draw simple conclusions, suggest improvements and raise further questions. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary. **Healthy diet/food groups – how much sugar (focus on one food group) is in our diet and what happens if we eat too much/too little? (Pattern seeking – survey)** • With support decide how to record and present evidence. • Record their measurements using tables and/or tally charts (given templates, if required, to which they can add headings). • Answer their own and others' questions based on observations ensuring the answers are consistent with the evidence. • Following a scientific experience, ask further questions which can be answered by extending the same enquiry.		
Rocks Summer 2	**rocks, igneous, sedimentary, metamorphic, fossils, soil, permeable, impermeable, texture, properties**	**How hard are different types of rocks? (comparative testing)** • Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher. • With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. • Make careful observations.	**How hard are different types of rocks? (comparative testing)** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to make comparative tests.	**How hard are different types of rocks? (comparative testing)** • With support decide how to record and present evidence. • Record observations using photographs, labelled diagrams or writing. • Answer their own and others' questions based on observations ensuring the answers are consistent with the evidence. • Interpret data/findings to generate simple comparative statements based on evidence (similarities and differences). • Use results to draw simple conclusions • Identify ways in which they complete enquires differently. • Following a scientific experience, ask further questions which can be answered by extending the same enquiry. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary.	• Compare the simple physical properties of different kinds of rocks. • Group different kinds of rocks based on their appearance. Describe in simple terms how fossils are formed. • Recognise that soils are made from rocks and organic matter. • Identify sedimentary, igneous and metamorphic rocks. Explain how different types of rocks are formed. • Explain why some rocks are permeable and some are not. • Ask relevant questions. • Use diagrams and tables to record evidence. • Recognise patterns that relate to scientific ideas. • Set up a fair or comparative test. • Write a conclusion based on evidence.	Table – to record notes of findings/ observations about how hard rocks were when tested Table/sorting diagram - (children's choice – they are to select ways to record and present from Venn and Carroll diagrams) for classifying permeable or impermeable rocks. Writing as a scientist – written question and conclusion for 'permeable or impermeable' investigation

		Which types of rocks are permeable or impermeable? (Identifying/classifying) • Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher. • With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. • Make systematic and careful observations. **Which types of soil (properties) will water pass through quicker or slower? (comparative and fair testing)** • Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher. • With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. • Make systematic and careful observations. • Use a range of equipment for measuring time and capacity using standard units.	**Which types of rocks are permeable or impermeable? (Identifying/classifying)** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to make observations and tests to classify. **Which types of soil (properties) will water pass through quicker or slower? (comparative and fair testing)** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to make comparative and simple fair tests	**Which types of rocks are permeable or impermeable? (Identifying/classifying)** • With support decide how to record and present evidence. • Record classifications using tables, Venn diagrams, Carroll diagrams. • Answer their own and others' questions based on observations the answers are consistent with the evidence. • Use results to draw simple conclusions suggest improvements and raise further questions. • Identify ways in which they complete enquires differently. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary. **Which types of soil (properties) will water pass through quicker or slower? (comparative and fair testing)** • With support decide how to record and present evidence. • Record their measurements using tables, tally charts and bar charts (given templates, if required, to which they can add headings). • Answer their own and others' questions based on observations and measurements ensuring the answers are consistent with the evidence. • Interpret data/findings to generate simple comparative statements based on evidence (similarities and differences). • Begin to identify naturally occurring patterns and causal relationships. • Use results to draw simple conclusions, suggest improvements and raise further questions. • Identify ways in which they complete enquires differently. • Use evidence to suggest values for different items tested using the same method Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary.		
Light Spring 1 -2	**light, dark, reflect, reflection, surface, sun, shadows, solid**	**Investigating Shadow Size: How does the distance of the light source from the object affect the size of the shadow produced? (Fair testing)**	**Investigating Shadow Size: How does the distance of the light source from the object affect the size of the shadow produced? (Fair testing)**	**Investigating Shadow Size: How does the distance of the light source from the object affect the size of the shadow produced? (Fair testing)** • With support decide how to record and present evidence.	• Understand that humans, and other animals, need light to see things. • Recognise that dark is the absence of light.	Venn diagram – sorting and classifying reflective and non reflective materials

	object, opaque, translucent	• Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher. • With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. • Make careful observations. • Use a range of equipment for measuring length using standard units. **Investigate which types of materials light travels through – which materials are transparent, translucent and opaque? (Identifying and classifying)** • Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher. • With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. • Make careful observations.	• Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to pattern seek. **Investigate which types of materials light travels through – which materials are transparent, translucent and opaque? (Identifying and classifying)** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to make observations and tests to classify.	• Record their measurements using tables (given templates, if required, to which they can add headings). • Answer their own and others' questions based on measurements ensuring the answers are consistent with the evidence. • Begin to identify naturally occurring patterns and causal relationships. • Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. • Identify ways in which they complete enquires differently. • Use evidence to suggest values for different items tested using the same method • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary. **Investigate which types of materials light travels through – which materials are transparent, translucent and opaque? (Identifying and classifying)** With support decide how to record and present evidence. Record classifications using tables, Venn diagrams, Carroll diagrams. Answer their own and others' questions based on observations ensuring the answers are consistent with the evidence. Use results to draw simple conclusions and raise further questions. Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary.	• Understand that light is reflected from surfaces and explain how reflection enables us to see objects which are not light sources. • Recognise that light from the sun can be dangerous and that there are ways to protect the eyes. • Recognise that shadows are formed when the light from a light source is blocked by a solid object. • Find patterns in the way that the sizes of shadows change. • Describe the relationship between the position of a light source and the size/shape of a shadow. • Identify objects that are translucent, opaque and transparent. • Ask relevant, testable questions. • Use various ways to record, group and display evidence. • Use a range of equipment as instructed. • Present findings either in writing or orally. • Use tables to record evidence. • Present key findings in writing.	Table – shadow size - record of measurements of distance between object and light source and the length of shadow Writing as a scientist – written question, prediction and conclusion for 'translucent, transparent and opaque materials' investigation
Forces and Magnets Autumn 2	**fair test, forces, push, pull, surface, gravity, magnet, magnetic, attract, repel, poles, material**	**Magnetic materials investigation – are materials magnetic or not magnetic? (identifying and classifying)** • Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher.	**Magnetic materials investigation – are materials magnetic or not magnetic? (identifying and classifying)** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to make observations and tests to classify.	**Magnetic materials investigation – are materials magnetic or not magnetic? (identifying and classifying)** • With support decide how to record and present evidence. • Record classifications using tables, Venn diagrams, Carroll diagrams. • Answer their own and others' questions based on observations ensuring the answers are consistent with the evidence.	• Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Notice how magnets attract or repel each other and attract some materials and not others.	Venn diagram – to record how children identify and classify magnetic/non magnetic materials Table – record of if magnets could attract a paper clip through different materials

		• With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. • Make careful observations. **Can magnets attract through different materials? (comparative testing)** • Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher. • With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. • Make careful observations. **How do things move on different surfaces? (Fair testing)** • Consider prior knowledge when asking questions independently using range of question stems. Where appropriate, answer these questions. • Answer questions posed by the teacher. • With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. •	**Can magnets attract through different materials? (comparative testing)** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to make comparative tests. **How do things move on different surfaces? (Fair testing)** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to make simple fair tests.	• Use results to draw simple conclusions and raise further questions. • Following a scientific experience, ask further questions which can be answered by extending the same enquiry. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary. **Can magnets attract through different materials? (comparative testing)** • With support decide how to record and present evidence. • Record their observations using tables (given templates, if required, to which they can add headings). • Answer their own and others' questions based on observations ensuring the answers are consistent with the evidence. • Interpret data/findings to generate simple comparative statements based on evidence (similarities and differences). • Use results to draw simple conclusions and raise further questions. • Following a scientific experience, ask further questions which can be answered by extending the same enquiry. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary. **How do things move on different surfaces? (Fair testing)** • With support decide how to record and present evidence. • Record observations using pictures, labelled diagrams or writing. • Interpret findings to generate simple comparative statements based on evidence (similarities and differences). • Begin to identify naturally occurring patterns and causal relationships. • Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. • Identify ways in which they complete enquires differently.	• Compare and group together a variety of everyday materials to see if they are magnetic or not. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing. • Describe the relationship between magnetic force and magnetic field. • Develop testable questions. • Suggest how an investigation could be extended. • Draw and label diagrams. • Plan a given type of enquiry. • Use standard units when taking measurements. • Present key findings in writing	Writing as a scientist – written question, prediction and method for 'are materials magnetic or not magnetic' investigation

				• Use evidence to suggest values for different items tested using the same method e.g. distance travelled by a car on an additional surface. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary.		
Year 4	**Vocabulary**	**Find out (Observe)**	**Try it out/Test (Explore/investigate)**	**What do we know/did we find out? (Record/conclude)**	**Substantive Knowledge**	**Independent work opportunities and writing like a scientist**
Animals Including Humans (Digestion) **Spring 1**	human body, teeth, canine, molar, incisor, digestion, digestive system, stomach, oesophagus, intestine, anus, rectum	**Investigate the effects of acid on teeth (eggshell investigation) (observations over time).** • Consider prior knowledge when asking questions independently using range of question stems. •Where appropriate, they answer these questions. • Answer questions posed by the teacher. • Given a range of resources, they decide for themselves how to gather evidence to answer the question. • Make systematic and careful observations over time. •Decide the type of enquiry.	**Investigate the effects of acid on teeth (eggshell investigation) (observations over time).** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out observations over time.	**Investigate the effects of acid on teeth (eggshell investigation) (observations over time).** • Decide how to record and present evidence. • Record observation using annotated diagrams and writing. •Communicate findings to an audience in writing, using appropriate scientific vocabulary. •Answer their own and others' questions based on observations. The answers are consistent with the evidence. • Identify ways in which they complete enquires differently. • Following a scientific experience, ask further questions which can be answered by extending the same enquiry.	• Identify the different types of teeth in human incisors, canines, molars. • Describe the simple functions of different types of teeth incisors, canines, molars. • Describe the effects of acid on teeth. • Name the main parts of the digestive system. • Describe the journey of food through the digestive system. • Describe the functions of the main organs in the digestive system. • Identify producers, predators and prey. • Construct and interpret basic food chains.	Annotated diagram – child drawn food chain diagram identifying producers, predators and prey. Annotated diagram – child drawn diagram showing observations of their egg shell before and after. Writing as a scientist – written prediction and conclusion for 'eggshell investigation'.
Electricity **Autumn 2**	electricity, appliance, mains batter/cell, circuit, component, current, light bulb, lamp, buzzer, switch, motor, complete, incomplete, conductor, insulator	**Explore appliances to identify if they are mains or battery powered (classify; compare and pattern seek).** • Consider prior knowledge when asking questions independently using range of question stems. **Investigate by making circuits shown in diagrams to test if circuits are complete or incomplete (observations, simple fair tests; and pattern seeking).** •Decide the type of enquiry. •With guidance, given a range of resources, they decide for themselves	**Explore appliances to identify if they are mains or battery powered (classify; compare and pattern seek).** Follow their plan to carry out: observations and tests to classify; compare and pattern seek. **Investigate by making circuits shown in diagrams to test if circuits are complete or incomplete (observations, simple fair tests; and pattern seeking).** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher.	**Explore appliances to identify if they are mains or battery powered (classify; compare and pattern seek).** •Decide how to record and present evidence. •Communicate findings to an audience orally and, using appropriate scientific vocabulary. •Record classifications using Carrol and Venn diagrams. **Investigate by making circuits shown in diagrams to test if circuits are complete or incomplete (observations, simple fair tests; and pattern seeking).** •Decide how to record and present evidence. •Draw conclusions based on evidence and current subject knowledge.	• Identify common appliances that run on electricity. • Construct a simple series electrical circuit. • Identify and name basic parts of a circuit. • Identify whether or not a lamp will light in a simple series circuit. • Recognise that a switch opens and closes a circuit and associate this with light in a series circuit. • Recognise some common conductors and insulators. • Identify different metals that are good conductors.	Carroll diagram/Venn diagram - (children's choice – they are to select ways to record and present) for classifying battery and mains powered appliances. Table – record whether materials are insulators or conductors. Writing as a scientist – written conclusion for insulators and

		how to gather evidence to answer the question. **Investigate whether circuits contain materials that are conductors or insulators (observations, classification).** • Answer questions posed by the teacher • Where appropriate, they answer these questions. • Given a range of resources, decide for themselves how to gather evidence to answer the question. •Decide the type of enquiry. •Make systematic and careful observations.	• Follow their plan to carry out: observations, simple fair tests; and pattern seeking. **Investigate whether circuits contain materials that are conductors or insulators (observations, classification).** •Follow their plan to carry our observations and tests to classify conductors and insulators.	•Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary. **Investigate whether circuits contain materials that are conductors or insulators (observations, classification).** •Begin to identify naturally occurring patterns and causal relationships. •Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions •Record classifications using tables. • Use evidence to suggest values for different items tested using the same method. • Following a scientific experience, ask further questions which can be answered by extending the same enquiry • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary.	• Construct a simple series circuit, trying different components such as bulbs, buzzers and motors. • Draw a circuit as a pictorial representation. • Describe ways in which electricity can be dangerous. • Describe how to stay safe around electricity.	conductors investigation.
States of Matter **Spring 2/ Summer 1**	solid, liquid, gas, heat, cool, freezing, melting, evaporation, state, reversible, irreversible particles,	**Solid, liquid or gas? (classifying)** • Decide the type of enquiry. **Melting Chocolate. How long does it take different types of chocolate to melt at the same temperature? (comparative and fair testing).** • Make systematic and careful observations. •With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. **How does the temperature of water effect melt rates (observations over time)?** • Answer questions posed by the teacher.	**Solid, liquid or gas? (classifying)** • Support children to classify **Melting Chocolate. How long does it take different types of chocolate to melt at the same temperature? (comparative and fair testing).** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to make comparative and fair testing. **How does the temperature of water effect melt rates (observations over time)?** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher.	**Solid, liquid or gas? (classifying)** • Record classifications using Venn diagrams. •Use results to draw simple conclusions and raise further questions. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary. **Melting Chocolate. How long does it take different types of chocolate to melt at the same temperature? (comparative and fair testing).** • Decide how to record and present evidence. • Record using tables and bar charts. • Interpret data to generate simple comparative statements based on evidence (similarities and differences). • Communicate findings to an audience in writing using appropriate scientific vocabulary. **How does the temperature of water effect melt rates (observations over time)?** • With support decide how to record and present evidence. • Record observations using photographs, videos, pictures, labelled diagrams or writing.	• Compare and group materials together, according to whether they are solids, liquids or gases. • Give simple descriptions of the different states of matter (solids, liquids and gases). • Explain that solids, liquids and gases change state when they are heated or cooled. • Explain that solids, liquids and gases change state when they are cooled; internal energy decreases; particles move less. • State the temperature at which changes of state occur, in degrees Celsius. • Identify the part played by evaporation and condensation in the water cycle. • Describe the relationship between temperature and evaporation. • Identify and describe changes of state that are reversible. • Describe the properties of particles in different states of matter. •	Tables and bar charts – record and present chocolate melting time Writing as a scientist – written prediction, method and conclusion for chocolate melting time. Tables and time graphs – record and present what is the best dish for a bird water bowl.

		•With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. • Make systematic and careful observations. • Use a range of equipment and thermometers for measuring length, time, temperature and capacity using standard units. • Make systematic and careful observations. • Use a range of equipment and thermometers for measuring length, time, temperature and capacity using standard units. **Evaporation. What is the best dish for a bird water bowl? (observations over time)** • Answer questions posed by the teacher. •With guidance, given a range of resources, they decide for themselves how to gather evidence to answer the question. • Decide the type of enquiry. • Make systematic and careful observations. • Use a range of equipment and thermometers for measuring length, time, temperature and capacity using standard units.	• Follow their plan to carry out/support children to make observations over time **Evaporation. What is the best dish for a bird water bowl? (observations over time)** • Select practical resources to gather evidence to answer questions generated by themselves or the teacher. • Follow their plan to carry out/support children to make observations over time	•Record measurements using tables and bar charts • Answer their own and others' questions based on observations, measurements or secondary sources ensuring the answers are consistent with the evidence. • Identify ways in which they complete enquires differently. • Following a scientific experience, ask further questions which can be answered by extending the same enquiry. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary. **Evaporation. What is the best dish for a bird water bowl? (observations over time)** • With support decide how to record and present evidence. • Record measurements using tables and time graphs. • Answer their own and others' questions based on observations, measurements or secondary sources ensuring the answers are consistent with the evidence. • Following a scientific experience, ask further questions which can be answered by extending the same enquiry. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary.		
Sound Autumn 1	**sound vibrate vibration ear canal ear drum pitch volume sound wave/ wavelength**	**Sound Sandwich- How is sound made? (pattern seek)** •Answer questions posed by the teacher. •Make careful observations. **Explore sounds and vibrations. (pattern seek)** •Answer questions posed by the teacher. •Make systematic and careful observations. •Decide the type of enquiry.	**Sound Sandwich- How is sound made? (pattern seek)** Support children to make observations and to pattern seek. **Explore sounds and vibrations. (pattern seek)** Support children to make observations and to pattern seek.	**Sound Sandwich- How is sound made? (pattern seek)** •Answer others' questions based on observations. •Communicate these findings orally. • Record observations using labelled diagrams or writing. **Explore sounds and vibrations. (pattern seek)** •Begin to identify naturally occurring patterns and causal relationships. •Use results to draw simple conclusions, make predictions for new values. • Record observations using labelled diagrams	•I know and can explain that sounds are made when objects vibrate and create wavelengths. •Understand that vibrations from sounds travel through the ear canal to the eardrum (medium). •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. •Explain what a sound wave shows.	Labelled diagram – child drawn diagram showing how wavelengths and objects react to vibration. Labelled diagram – child drawn diagram showing how pitch is affected by the volume of water. table and bar chart – child drawn tale and bar chart showing

		Investigate pitch in a bottle orchestra (pattern seek) • Consider prior knowledge when asking questions independently using a range of question stems. •Given a range of resources, they decide for themselves how to gather evidence to answer the question. •Decide the type of enquiry. • Make systematic and careful observations. •Use a range of equipment for measure capacity. Use standard units for their measurements **Investigate how distance affects sound (pattern seeking)** • Decide the type of enquiry.	**Investigate pitch in a bottle orchestra (pattern seek)** •Select practical resources to gather evidence to answer questions generated by themselves or the teacher. Support children to make observations; to pattern seek and make a comparative test. **Investigate how distance affects sound (pattern seeking)** • Follow their plan to carry out/support children to make: comparative and simple fair tests; pattern seek.	**Investigate pitch in a bottle orchestra (pattern seek)** • Record their measurements using tables. • Interpret data/findings to generate simple comparative statements based on evidence (similarities and differences). •Begin to identify naturally occurring patterns and causal relationships. •Identify ways in which they complete enquires differently. -Record measurements using tables and bar graphs. **Investigate how distance affects sound (pattern seeking)** •Use results to draw simple conclusions and raise further questions. •Begin to identify naturally occurring patterns and causal relationships. • Use evidence to suggest values for different items tested using the same method.		how pitch is affected by the volume of water. Writing as a scientist – written prediction and conclusion for pitch.
Living Things and their Habitats **Summer 2**	classify, classification, key, branching, adaptation, invertebrate, vertebrate, amphibian, mammal, reptile exoskeleton, climate,	**Explore identifying and classifying living things.** •Consider prior knowledge when asking questions independently using range of question stems. •Where appropriate, they answer these questions. •Answer questions posed by the teacher. • Make systematic and careful observations. **Explore local habitats and decide which organisms are adapted to live there. (classification)** •Answer questions posed by the teacher. •Decide the type of enquiry.	**Explore identifying and classifying living things.** by using a range of keys, branching databases and classification charts. **Explore local habitats and decide which organisms are adapted to live there. (classification)** • Follow their plan to carry out/support children to make observations to classify;	**Explore identifying and classifying living things.** • Decide how to record and present evidence. • Record classifications branching keys • Support children to present the same data in different ways in order to help with answering the question. •Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions **Explore local habitats and decide which organisms are adapted to live there. (classification)** • Answer their own and others' questions based on observations and information gained from secondary sources. • Communicate findings to an audience both orally and in writing, using appropriate scientific vocabulary.	• Use a classification key to identify invertebrates. • Create a classification key for a group of organisms from the local environment. • Use a classification key to identify familiar organisms. • Understand that living things (both plants and animals) can be grouped in a variety of ways. Amphibians, birds, mammals, reptiles, fish, • Classify animals into commonly found vertebrates and invertebrates • Use classification keys to help group, identify and name a variety of living things. • Recognise that environments can change and this can pose dangers to living things in the local and wider environment. • Explain the positive and negative impact of humans on the environment. • Design my own classification key to group more than 3 organisms.	• Branching key • Grounds survey • Writing as a scientist – Written conclusion justifying group classification for an animal of their choice.

					• Explain which type of habitat is best suited to a given organism and how changing environments can pose dangers.	
Year 5	**Vocabulary**	**Find out (Observe)**	**Try it out/Test (Explore/investigate)**	**What do we know/did we find out? (Record/conclude)**	**Substantive Knowledge**	**Independent work opportunities and writing like a scientist**
Living things and their habitats **Autumn 2**	stigma, style, pollen tube, ovary, ovule, pistil, petal, anther, filament, stamen, sepal, sexual/asexual, reproduction, pollen, insect / wind pollination, pollinator metamorphosis	**Investigate the reproductive parts of a flowering plant (observing)** Make decisions e.g. whether they need to: check further secondary sources (researching); in order to get accurate data (closer to the true value).	**Investigate the reproductive parts of a flowering plant (observing)** Independently decide what observations to make.	**Investigate the reproductive parts of a flowering plant (observing)** •With increasing independence decide how to record and present evidence. • Record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. • Answer their own and others' questions based on observations and information gained from secondary sources ensuring answers are consistent with evidence. •Discuss whether other evidence from secondary sources supports or refutes answers. • Evaluate the credibility of secondary sources used. • Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations using relevant scientific language and vocabulary.	• Describe the life cycle of a mammal (hedgehog). • Describe the life cycle of an amphibian (frog). • Describe the lifecycle of an insect (beetle). • Describe the lifecycle of a bird (native bird to the UK). • Compare the lifecycle of a mammal, amphibian, insect or bird. • Name the reproductive parts of a plant for asexual and sexual reproduction. • Explain how plants reproduce asexually. • Explain how sexual reproduction occurs in plants. • Describe the difference between asexual and sexual reproduction in plants. • Know who David Attenborough is and describe his works.	**Independent work opportunities** Research reproductive parts of a flowering plant- Annotated diagram Record observations of a lily using annotation to show reproductive parts Writing as a scientist Written explanation of parts and function of the reproductive parts of a flowering plant
Animals including humans Summer 2	embryo, foetus, gestation, puberty, adolescence, reproduction, offspring, foetus, egg, sperm, sexual	**Investigate mammal's gestation periods (pattern seeking).** • Choose a type of enquiry to carry out and justify their choice.	**Investigate mammal's gestation periods (pattern seeking).** • Independently look for patterns and relationships using a suitable sample. **Foetal Development (pattern seeking)**	**Investigate mammal's gestation periods (pattern seeking).** •With increasing independence decide how to record and present evidence. •Record measurements tables and bar charts • Answer their own and others' questions based on observations, measurements or information gained from secondary sources ensuring answers are consistent with evidence. •Discuss whether other evidence e.g. from other groups, secondary sources and scientific understanding, supports or refutes answers.	• Discuss how different animals reproduce. • Compare the gestation periods of different animals and link to humans. • Examine the correlation between the age of reproduction of a mammal and its size of litter and link to humans. • Interpret gestation data relating to mammals and draw conclusions. • Use various ways to show complex evidence.	**Independent work opportunities** Time graph of a foetal development Table record the gestation period of animals in a table including humans Writing as a scientist

		Foetal Development (pattern seeking) • Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. **Children's Development in to Adults (pattern seeking)** • Using a wide range of resources decide for themselves how to gather evidence to answer a scientific question. • Choose a type of enquiry to carry out and justify their choice. • Select measuring equipment and thermometers and data loggers to give the most precise results e.g. ruler, tape, measure or trundle wheel, force meter with a suitable scale.	Independently look for patterns and relationships using a suitable sample **Children's Development in to Adults (pattern seeking)** • Independently select from a range of practical resources to gather evidence to answer their questions. •Independently look for patterns and relationships using a suitable sample.	**Foetal Development (pattern seeking)** •Record measurements time graphs. **Children's Development in to Adults (pattern seeking)** •Record measurements tables and bar charts • Evaluate the choice of method used, the control of variables (different adults can be different heights). • In conclusions: identify causal relationships; patterns in the natural world from evidence; identify results that do not fit the overall pattern; explain findings using subject knowledge.	• Answer questions using evidence gathered from different types of enquiry. • Use a graph to record basic data.	Written conclusion to compare similarities and difference between results child to adult development
Properties and changes of materials **Spring 1**	, soluble/insoluble, solvent, solute dissolve, solution, mixture, combustion, chemical reaction	**How can we clean our dirty water? (observations over time)** •Using a wide range of resources decide for themselves how to gather evidence to answer a scientific question. • Choose a type of enquiry to carry out and justify their choice. **Investigate everyday materials linked to solubility, transparency, conductivity and response to magnets (pattern seeking).** •Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry.to answer a scientific question. •Choose a type of enquiry to carry out and justify their choice.	**How can we clean our dirty water? (observations over time)** •Independently select from a range of practical resources to gather evidence to answer their questions. •Independently decide what observations to make. **Investigate everyday materials linked to solubility, transparency, conductivity and response to magnets (pattern seeking).** •Independently look for patterns and relationships using a suitable sample	**How can we clean our dirty water? (observations over time)** •With increasing independence decide how to record and present evidence. •Record observations using annotated labelled diagrams, and observational drawings. • Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations using relevant scientific language and vocabulary. **Investigate everyday materials linked to solubility, transparency, conductivity and response to magnets (pattern seeking).** •Record classifications e.g. using tables, Venn diagrams or Carroll diagrams. • Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations using relevant scientific language and vocabulary.	• Compare and group together everyday materials on the basis of their properties (solubility, transparency, conductivity and response to magnets). • I know that some materials will dissolve in liquid to form a solution. • 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 for the particular uses of everyday materials, including metals, wood and plastic based on comparative and fair tests. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible. • Understand that the materials of oxygen, heat and fuel are needed for combustion to occur.	**Independent work opportunities** Record observation of the clarity of water over time Venn Diagram to record solubility of everyday materials Writing as a scientist Written evaluation the success of our experiment into cleaning dirty water including changes we would make nest time

St. Mary's - Science Curriculum - Knowledge Map

		Investigate the materials that are needed for combustion to occur Using a wide range of resources decide for themselves how to gather evidence to answer a scientific question.	**Investigate the materials that are needed for combustion to occur** Independently look for patterns and relationships using a suitable sample	**Investigate the materials that are needed for combustion to occur** Talk about how scientific ideas change due to new evidence gathered. • In conclusions: identify causal relationships; patterns in the natural world from evidence; identify results that do not fit the overall pattern; explain findings using subject knowledge.	• Observe the effects of burning on different materials.	
Earth and Space **Summer 1**	Solar System, Moon, Solar system, Star, gravity, orbit, axis, rotation, lunar eclipse, Moon phases	**Changing Shadows (observations over time)** •Choose a type of enquiry to carry out and justify their choice. • Make decisions e.g. whether they need to adjust the observation period and frequency (observing over time) and check further secondary sources (researching)	**Changing Shadows (observations over time)** •Independently select from a range of practical resources to gather evidence to answer their questions. •Independently decide what observations or measurements to make over time and for how long.	**Changing Shadows (observations over time)** •With increasing independence decide how to record and present evidence. •Record observations using tables and time graphs. • Answer their own and others' questions based on observations, measurements or information gained from secondary sources ensuring answers are consistent with evidence. • Evaluate the choice of method used, the control of variables, the precision and accuracy of measurements • Identify any limitations that reduce the trust they have in their data. • Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations using relevant scientific language and vocabulary.	• Name the 8 planets in the solar system. • Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. • Explain that the Earth rotates on an axis and how this causes day and night to occur. • Describe the movement of the Moon relative to the Earth. • Describe the Sun, Earth and Moon as approximately spherical bodies through the effect of an eclipse. • Explain why day and night occur. • Know that our Sun is a star in the centre of our solar system. • Explain why we experience different seasons on Earth.	**Independent work opportunities** Table to gather shadow measurements over time Time graph of shadow changeover time Writing as a scientist Conclude their finding on changing shadows
Forces Spring 2	acceleration, air resistance, balanced, force, friction, gravity, lever, mass, newtons, ,pulley, thrust, water resistance, surface area	**Investigate how different surfaces affect the speed of a moving object.** • Make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking) in order to get accurate data (closer to the true value). • Select measuring equipment to give the most precise results- stopwatch-ruler-tape measure **Investigate how the surface area of a parachute/helicopter affects the speed at which it will hit the ground.**	**Investigate how different surfaces affect the speed of a moving object.** • Independently select from a range of practical resources to gather evidence to answer their questions. • Independently carry out a comparative test and fair test, recognising and controlling variables. • Independently decide what observations or measurements to make over time and for how long. • Independently look for patterns and relationships using a suitable sample. **Investigate how the surface area of a parachute/helicopter affects the speed at which it will hit the ground.** Independently;	**Investigate how different surfaces affect the speed of a moving object.** •1) With increasing independence decide how to record and present evidence. • Identify any limitations that reduce the trust they have in their data. •Record observations using tables and bar charts. •Using test results make predictions to set up further comparative and fair tests • Use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests **Investigate how the surface area of a parachute/helicopter affects the speed at which it will hit the ground.**	• Explain that objects fall towards the Earth because of the force of gravity. • Identify the effects of air resistance that act between moving surfaces. The more surface area, the more air resistance. • Identify the effects of water resistance that act between moving surfaces as drag. • Identify the effects of friction that act between moving surfaces through air resistance and water resistance. • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect (DT link).	**Independent work opportunities** Bar charts and tables to record speed of a moving object over surfaces Writing as a scientist Written predictions using prior knowledge surface and speed experiments

		•Using a wide range of resources decide for themselves how to gather evidence to answer a scientific question. • Choose a type of enquiry to carry out and justify their choice. • Make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); in order to get accurate data (closer to the true value). • Select measuring equipment to give the most precise result. **Explore how the shape of an object dictates how much water resistance it will meet as it moves through the water.** •Using a wide range of resources decide for themselves how to gather evidence to answer a scientific question. • Choose a type of enquiry to carry out and justify their choice. • Make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); in order to get accurate data (closer to the true value). • Select measuring equipment to give the most precise result.	-carry out fair and comparative tests, recognising and controlling variables. -look for patterns and relationships using a suitable sample **Explore how the shape of an object dictates how much water resistance it will meet as it moves through the water.** Independently; -carry out fair and comparative tests, recognising and controlling variables. -look for patterns and relationships using a suitable sample	•Record measurements using tables and scatter graphs. •Answer their own and others' questions based on observations, measurements. • Evaluate the choice of method used, the control of variables, the precision and accuracy of measurements or the credibility of secondary sources used. In conclusions, identify patterns from evidence. • Use the test results/scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests (how changing the shape would increase or decrease the speed of which an object moves). **Explore how the shape of an object dictates how much water resistance it will meet as it moves through the water.** •Record measurements using tables/ bar charts. •Answer their own and others' questions based on observations, measurements. In conclusions, identify patterns from evidence. • Use the test results/scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests (how changing the shape would increase or decrease the speed of which an object moves).	• Identify when forces are balanced and unbalanced and explain how this relates to the movement of objects. • Describe the forces acting on an object and explain how changing the shape would increase or decrease the speed at which it moves.	Evaluate the accuracy of results
Year 6	**Vocabulary**	**Find out (Observe)**	**Try it out/Test (Explore/investigate)**	**What do we know/did we find out? (Record/conclude)**	**Substantive Knowledge**	**Independent work opportunities and writing like a scientist**
Living things and their habitats Spring 1	bacteria, fauna, flora, phylum. genus, family, fungi, micro-organism, kingdom, species	**Identifying arthropods in the local environment (classification)** • Choose a type of enquiry to carry out and justify their choice.	**Identifying arthropods in the local environment (classification)** Independently select from a range of practical resources to gather evidence to answer their questions.	**Identifying arthropods in the local environment (classification)** •Record finding using tables, tally charts, bar charts. •Record classifications e.g. using tables and classification keys. • Evaluate the choice of method used, the control of variables, the precision and accuracy of measurements or the credibility of secondary sources used.	• Explain what taxonomy is and why it is useful. • Give examples of the way in which living things are classified into broad group using the work of Carl Linneaus. • Explain that living things are grouped according to common observable differences.	• Independent work: -Create tally charts to record findings. -Use tables and classification keys to record findings.

					• Understand that broad groupings can be subdivided and can give examples of this. • Identify some common British trees using a classification system. • Identify trees in the local environment. • Identify and classify familiar arthropods (Invertebrates) in the local environment. • Give reasons for classifying plants and animals based on specific characteristics. • Justify my placement of unfamiliar animals and plants into the classification system. • Correctly order the stages in classification system. • Explain the significance of the work of Carl Linnaeus and how he developed the classification system.	Writing like a Scientist: Evaluate the success of the findings and the reliability and credibility.
Animals Including Humans (Circulatory system) Spring 2	arteries, blood vessel, capillaries, carbon dioxide, circulatory system, de-oxygenated, heart, heartbeat, lungs, oxygen, pulse, veins, ventricle atrium	**Investigate the effect of exercise on heart rate (observations over time).** •Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. •Choose a type of enquiry to carry out and justify their choice. •Make decisions e.g. whether they need to: take repeat readings (fair testing); adjust the observation period and frequency (observing over time); in order to get accurate data (closer to the true value). **Research the preferred form of exercise (research/pattern seeking)** • Choose a type of enquiry to carry out and justify their choice.	**Investigate the effect of exercise on heart rate (observations over time).** Independently carry out fair and comparative tests, recognising and controlling variables. -decide what observations or measurements to make over time and for how long. -look for patterns and relationships using a suitable sample **Research the preferred form of exercise (research/pattern seeking)** -look for patterns and relationships using a suitable sample	**Investigate the effect of exercise on heart rate (observations over time).** • With increasing independence decide how to record and present evidence. •Record measurements e.g. using tables, and time graphs. • Use the test results/scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests. • Identify any limitations that reduce the trust they have in their data. • In conclusions: identify causal relationships; patterns in the natural world from evidence; identify results that do not fit the overall pattern; explain findings using subject knowledge. **Research the preferred form of exercise (research /pattern seeking)** Record results using tally charts, bar charts or timegraphs. • Answer their own and others' questions based on observations, measurements or information gained from secondary sources ensuring answers are consistent with evidence. • Identify any limitations that reduce the trust they have in their data.	• Identify and name the main parts of the human circulatory system. Heart, blood, blood vessels, arteries, capillaries and explain their functions. • Describe the functions of the heart- to pump blood and oxygen. • Describe the functions of blood and blood vessels. To pump oxygen. • Name the left/ right atrium and rich/ left ventricle of the heart and explain their functions. • Describe the path that blood takes around the heart. • Recognise the impact that diet, exercise, drugs and lifestyle can have on the body with reference to the NHS Eatwell guide. • Describe the ways in which nutrients and water are transported within animals, including humans.	Independent Work Record and present measurements using tables and time graphs. Writing like a Scientist: Make predictions based on comparative and fair tests. Conclude findings and patterns as well as results.

					• Give examples of ways to keep our bodies healthy and describe the benefits to specific parts of our circulatory system.	
Evolution and Inheritance Summer 1 -2	extinct, decay, fossil/ fossilisation variation, gene, inherit, selection, inherit compress evolve	**Darwin's Finches (pattern seeking)** • Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Using a wide range of resources decide for themselves how to gather evidence to answer a scientific question. • Choose a type of enquiry to carry out and justify their choice. • Make decisions whether to increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value). •Make decisions whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking). **Family Inheritance (pattern seeking)** • Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. •Make decisions whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking). **Fossils enquiry (observation)** • Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Using a wide range of resources decide for themselves how to gather evidence	**Darwin's Finches (pattern seeking)** • Independently select from a range of practical resources to gather evidence to answer their questions. • Independently look for patterns and relationships using a suitable sample **Family Inheritance (pattern seeking)** • Independently look for patterns and relationships using a suitable sample **Fossils enquiry (observation)** Independently select from a range of practical resources to gather evidence to answer their questions. Decide what observations to make	**Darwin's Finches (pattern seeking)** •With increasing independence decide how to record and present evidence. • Record observations using annotated, labelled diagrams, labelled scientific diagrams and writing. • Answer their own and others' questions based on observations or information gained from secondary sources ensuring answers are consistent with evidence. •Discuss whether other evidence from other groups, secondary sources and scientific understanding, supports or refutes answers. • Talk about how scientific ideas change due to new evidence gathered. • In conclusions: identify causal relationships; patterns in the natural world from evidence; identify results that do not fit the overall pattern; explain findings using subject knowledge. **Family Inheritance (pattern seeking)** • Use the test results/scientific knowledge gained from enquiry work to make predictions they can investigate using comparative tests. • Record observations using annotated photographs/ labelled diagrams. •Answer their own and others' questions based on observations gained from secondary sources. •Report and present findings from enquiries, including conclusion in oral and written forms. **Fossils enquiry (observation)** •With increasing independence decide how to record and present evidence. •Record observations using annotated observational drawings. • In conclusions: identify causal relationships; patterns in the natural world from evidence; identify results that do not fit the overall pattern; explain findings using subject knowledge.	• Understand that fossils provide information about living things that inhabited the Earth millions of years ago. • Know that humans did not evolve from apes but have a common ancestor that evolved millions of years ago. • Understand the different stages of fossilisation. 1) Minerals in groundwater replace the bone. 2) The rock rises and is worn away by erosion. 3) Animal is buried by sediment and soft parts decay. 4) More sediment builds up and is compressed to form rock. • Recognise that living things (humans) have changed over time. • Recognise that living things produce offspring of the same kind, but they usually 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. • Explain how variation leads to competition. • Give examples of natural selection. **Fascinating Fossils Workshop Wakefield Museum (to book)** What are fossils and how are they formed? What can they tell us about prehistoric plants and animals? What ancient animals might have existed but whose fossils have not yet been found?	Independent Work: Record annotated, labelled diagrams. Working as a Scientist: Conclude relationships and patterns and identify results that don't fit the overall pattern. Explain why this might be the case.

		to answer a scientific question. • Choose a type of enquiry to carry out and justify their choice.		• Report and present findings from enquiries, including conclusions, causal relationships and in oral forms such as presentations using relevant scientific language and vocabulary.		
Light Autumn 2	cornea, dispersion, emit, iris, pupil, reflect, refraction, retina, spectrum,	**Use reflection to create a 'light' maze to explore light direction (pattern seeking).** •Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Using a wide range of resources decide for themselves how to gather evidence to answer a scientific question. • Choose a type of enquiry to carry out and justify their choice. **How are the shape and size of shadows determined? (pattern seeking)** • Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Choose a type of enquiry to carry out and justify their choice.	**Use reflection to create a 'light' maze to explore light direction (pattern seeking).** Make decisions e.g. whether they need to increase the sample size (pattern seeking); **How are the shape and size of shadows determined? (pattern seeking)** • Independently select from a range of practical resources to gather evidence to answer their questions. • Independently carry out fair and comparative tests, recognising and controlling variables.	**Use reflection to create a 'light' maze to explore light direction (pattern seeking).** •With increasing independence decide how to record and present evidence. • Record observations e.g. using annotated photographs, labelled diagrams, labelled scientific diagrams or writing. •Discuss whether other evidence e.g. from other groups, secondary sources and scientific understanding, supports or refutes answers. • Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as presentations using relevant scientific language and vocabulary. **How are the shape and size of shadows determined? (pattern seeking)** •With increasing independence decide how to record and present evidence. •Record measurements using a time graph. • Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written such as presentations using relevant scientific language and vocabulary.	• Recognise that light appears to travel in straight lines. • 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 and then to our eyes. • Use my knowledge to explain why shadows have the same shape as the objects that cast them. • Describe some functions of different parts of the eye. • Give examples of when refraction occurs and explain how it changes the path of a ray of light. • Define dispersion and explain why we sometimes see rainbows in the sky.	Independent work: Record observations when experimenting with shadows. Draw and label the functions of the eye. Writing as a Scientist: Compare the similairites and differences between results.
Electricity Autumn 1	component, function, series, symbols, voltage, volume	**Investigate the effect of changing the number and voltage of cells in an electrical circuit and how they affect the brightness of a lamp or volume of a buzzer with the number of voltage cells used in the circuit (comparative testing). (comparative testing).** • Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry.	**Investigate the effect of changing the number and voltage of cells in an electrical circuit and how they affect the brightness of a lamp or volume of a buzzer with the number of voltage cells used in the circuit (comparative testing). (comparative testing).** •Independently carry out comparative tests, recognising and controlling variables.	**Investigate the effect of changing the number and voltage of cells in an electrical circuit and how they affect the brightness of a lamp or volume of a buzzer with the number of voltage cells used in the circuit (comparative testing). (comparative testing).** •With increasing independence decide how to record and present evidence. • Record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams •Record measurements using scatter graphs. or writing. •Evaluate the choice of method used.	• Use symbols when drawing a simple circuit diagram. • 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 of the circuit function, including the brightness of bulbs, the volume of buzzers and the position of switches. • Identify the effect of changing one component (part of the circuit) at a time in a circuit. • Explain the role of insulators and conductors within a circuit,	Independent work: Draw and present circuits representing the different functioning elements. Investigate and explore changes and the impact. Writing as a Scientist:

		• Using a wide range of resources decide for themselves how to gather evidence to answer a scientific question. • Choose a type of enquiry to carry out and justify their choice. **Electrical Burglar Alarm: Compare and give reasons for how variations in components function including brightness of bulbs, loudness of buzzers and the on/off position of switches. ()** • Independently ask scientific questions stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Using a wide range of resources decide for themselves how to gather evidence to answer a scientific question.	**Electrical Burglar Alarm: Compare and give reasons for how variations in components function including brightness of bulbs, loudness of buzzers and the on/off position of switches. ()** • Independently select from a range of practical resources to gather evidence to answer their questions.	•Report and present findings from enquiries, including conclusions and degree of trust in results, in oral and written forms. **Electrical Burglar Alarm: Compare and give reasons for how variations in components function including brightness of bulbs, loudness of buzzers and the on/off position of switches. ()** •With increasing independence decide how to record and present evidence. • Answer their own and others' questions based on observations, measurements or information gained from secondary sources ensuring answers are consistent with evidence.	identifying parts of the circuit which are insulators or conductors. .	Written conclusion after analysing data

<u>The scientific method</u>

1. Make an observation.
2. Ask a question.
3. Form a hypothesis, or testable explanation.
4. Make a prediction based on the hypothesis.
5. Test the prediction.
6. Iterate: use the results to make new hypotheses or predictions.