St Helen's Science Progression Map

Substantive Knowledge- The established facts that we want children to know and remember

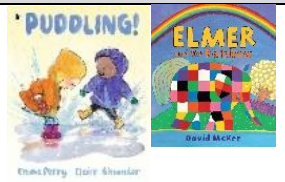
Children will develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
There are 6 key areas that will be taught across their science primary education. These are:

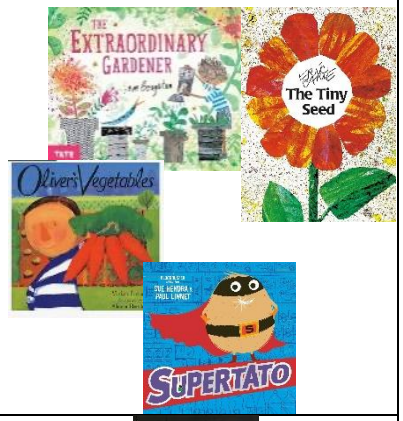
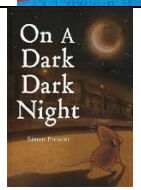
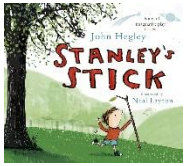
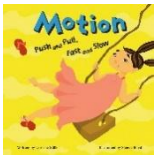
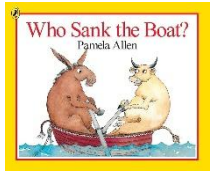
- Animals including humans
- Living things and their habitats
- Materials
- Energy
- Forces
- Earth and space

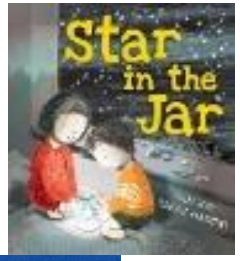
Disciplinary Knowledge- The methods that we want the children to use to find out the facts- thinking and acting like a scientist

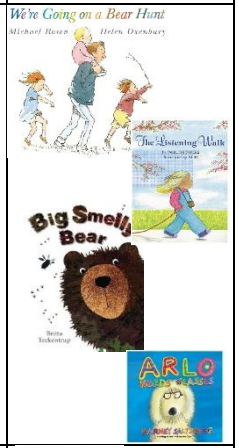
Children will develop understanding of the nature, processes and methods of science through different types of scientific enquiries that help them to answer scientific questions about the world around them. These core skills for working scientifically are:

Key Stage 1- Years 1 and 2	**Lower Key Stage 2- Years 3 and 4**	**Upper Key Stage 2- Years 5 and 6**
• Asking simple questions and recognising that they can be answered in different ways. • Observing closely using simple equipment. • Performing simple tests • Identifying and classifying • Using their observations and ideas to suggest answers to questions. • Gathering and recording data to help in answering questions.	• Setting up simple practical enquiries, comparative and fair tests. • Making systematic and careful observations and, where appropriate • Taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. • Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. • Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. • Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. • Identifying differences, similarities or changes related to simple scientific ideas and processes. • Using straight forward scientific evidence to answer questions or to support their findings.	• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. • Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • Using test results to make predictions to set up further comparative and fair tests. • Reporting and presenting 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 or arguments.

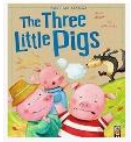
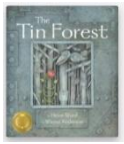
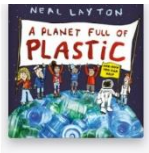
Reception				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts/ hook book**
Seasonal Changes	To name the 4 seasons- spring, summer, autumn and winter To suggest which season is shown in a photo To suggest clothes we might wear in different seasons.	• To sort pictures under the headings spring summer, autumn, and winter. • To sort clothes for the seasons. • To use their senses to explore and describe the seasons.	weather, sun, rain, wind, fog, mist, puddle, rainbow, snow, ice temperature- hot, cold, warm seasons, spring, summer, autumn, winter,	
Animals including humans:	To point to their head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth To name some pets, zoo animals and some wild animals that live in the UK. To name some nocturnal animals- bat, hedgehog, fox, badger To know that some animals like hedgehogs, dormice bears and bats hibernate during the winter. To name some adult and baby animals- chicken/ chick, duck/ duckling, sheep/ lamb, cow/ calf, cat/ kitten, dog/ puppy, horse/ foal. pig/ piglet To describe butterfly and frog life cycles. To name some creatures that live in the sea. To name some minibeasts that may be found in gardens or on the school playground.	• To sing songs such as head, shoulders, knees and toes pointing to the correct body part. • To sort zoo animals and UK wild animals • To find out about nocturnal animals and those that hibernate from books and the internet • To match adult animals to their young. • To order pictures of animal life cycles • To observe butterfly eggs /frogspawn in class over time • To go on a mini beast hunt • To learn about sea creatures through stories and the internet	body, head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth nocturnal- bat, hedgehog, fox, badger hibernate pet/ wild/ zoo/ minibeast life cycle- egg, caterpillar, chrysalis, butterfly frogspawn, tadpole, froglet, frog chicken/ chick, duck/ duckling, sheep/ lamb, cow/ calf, cat/ kitten, dog/ puppy, horse/ foal. pig/ piglet	
Plants	To know that seeds and bulbs can grow into plants To point to the stem, leaf and flower of a plant. To name some fruits and vegetables and know that they come from plants are healthy for us to eat.	• To plant seeds and bulbs and watch them grow. • To identify some plants on the playground. • To taste, smell and talk about the appearance of	Seed, bulb, plant, tree, stem, flower, leaf fruit, vegetable healthy	

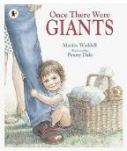
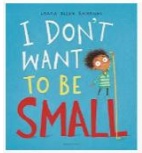
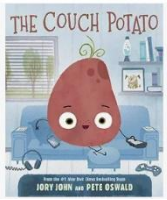
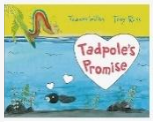
	To know that leaves fall from trees in autumn time.	different fruit and vegetables. • To collect and describe autumn leaves.		
Electricity	To name items in the home and classroom which use electricity	• To find items in the classroom which use electricity • To learn how to safely use electricity • To turn off the lights when we are not using them.	electricity, computer, lights, TV, cooker, fridge, washing machine, phone charger,	
Materials	To name some objects that are natural materials such as petals, bark, shells, soil, sand, pebbles, sticks, feather, acorn, pine cone To use senses to describe an object- soft, hard, light, heavy, To know that there are lots of different materials that things are made from. To know that we can change materials by squashing, bending, twisting and squeezing them and that we can change some materials by heating, cooling, melting and freezing them.	• To find natural materials on the playground/ on weekend walks • To create collages using natural materials • To use senses to describe them • To explore freezing and melting water.	natural materials- petals, bark, shells, soil, sand, pebbles, sticks, feather, acorn, pine cone soft, hard, light, heavy, spiky, shiny, bumpy squash, bend, twist, squeeze, heat, cool, melt, freeze	
Forces	To know that float means stay at the surface of water and sink means to go to the bottom. To name some objects which we push to move and some that we pull to move.	• To explore which objects float and sink • To make predictions before testing • To talk about how to make a test fair • To explore pushing and pulling forces	sink, float, push, pull	 

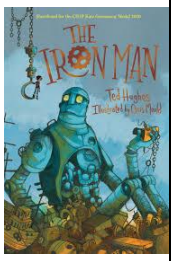
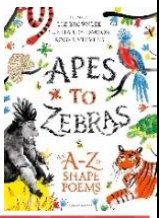
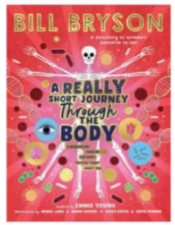
Earth and space	To know that the sun and stars in the sky give off light. To know that the moon in the sky does not give off light and we see it because of the sun. To find shadows on the playground and know they are made by blocking the sunlight. To know that it is dangerous to look straight at the sun.	• To observe shadows on the playground • To observe the moon and stars at night time	sun, moon, stars, sky, day, night, shadow	

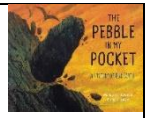
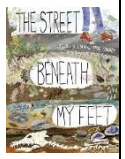
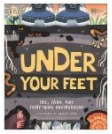
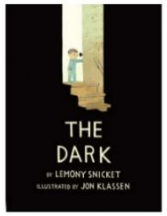
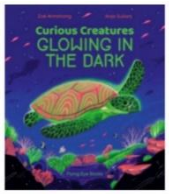
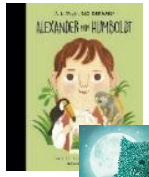
Key stage 1 Cycle A				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts/ hook book**
Seasonal Changes	To know the name and order of the four seasons; spring, summer, autumn and winter. To know weather associated with the four seasons and how it changes (in the UK). To understand that day length varies across the four seasons, with fewer daylight hours in the winter and more in the summer.	• Complete a pictogram and use it to answer simple questions. • Record data about the temperature across the four seasons	weather seasons, spring, summer, autumn, winter, sunrise, sunset, temperature, thermometer data, predict, record, conclusion, pictogram	
Animals including humans: Sensitive bodies	To know key parts of the human body (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth). To know the five main senses: sight, smell, hearing, taste and touch. To know that the skin is used for touch, the tongue is used for taste, the nose is used for smell, the eyes are used for sight and the ears are used for hearing	• Compare and group body parts. • Begin to recognise patterns in data and use these to answer questions. • Record data in a table. • Measure using non-standard units. • Recognise what the scientist Miller Hutchinson was known for.	body, head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth, senses, sight, smell, hearing, taste, touch. feeling, blind, deaf, sensitive bitter, sweet, salty, sour, hot, cold loud, quiet, direction, distance investigation, compare, group, data, research	
Animals including humans: Comparing animals	To know the main body parts of common animals (arms, legs, wings, tails, fins, head, trunk, horns/tusks, shell) To know a variety of common animals (including fish, amphibians, reptiles, birds and mammals). To know that a carnivore is an animal that eats other animals, a herbivore is an animal that eats only plants and an omnivore is an	• Use a non-fiction text to find out about specific animals' diets. • Recognise that there are different ways to gather data. • Record data in a block graph and use this to answer questions. • Recognise what the scientist Jane Goodall was known for.	arms, legs, wings, tails, fins, head, trunk, horns/tusks, shell, fish, amphibians, reptiles, birds, mammals, diet, hunt, herbivore, carnivore, omnivore	

	animal that eats both animals and plants, and to give some examples.	• Recall some of Jane Goodall's key findings.	compare, differences, similarities, group, data, observe, record, scientist, tally, research	
Living things: Habitats **Living things: Microhabitats**	To know the difference between things that are living, dead, and things that have never been alive, using some of the life processes (movement, reproduction, sensitivity, growth, excretion and nutrition). To name a variety of habitats, including a microhabitat, woodland, ocean, rainforest and seashore and know that a habitat is the environment where an animal or plant lives/ grows, because it provides what they need to survive. To know that living things depend upon each other (e.g. for food, shelter.) To understand that a food chain can be used to show how animals obtain food from eating either plants and/or other animals and to describe some.	• Ask questions to further their knowledge and know they can be answered in different ways. • Classify objects into alive, never been alive and was once alive, giving reasons for their choices. • Match different plants and animals to their habitats. • Give examples of how animals use their habitat for food and shelter. • Name living things that are producers and place a producer at the beginning of a food chain. • Use arrows to show the order in a food chain. Group minibeasts and create simple classification keys. • Gather and record data and use it to answer questions. • Plan what observations to make in an experiment. • Order the steps of a method. • Describe the appearance of flowering plants. • Use an identification chart to name flowering plants.	living/ alive, dead, never been alive, life processes, movement, reproduction, sensitivity, growth, excretion, nutrition, habitat, environment, microhabitat, woodland, ocean, rainforest, seashore, coastal, rainforest depend, food, shelter, camouflage, nocturnal food chain, diet, carnivore, herbivore, omnivore, energy, producer, predator, prey analyse, classify,	

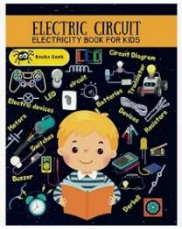
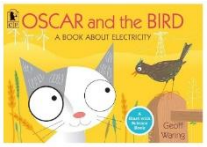
Key stage 1 Cycle B				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts / hook book**
Materials: Everyday materials	To know that a material is what an object is made from. To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. To know that property refers to how a material can be described and describe the physical properties of a variety of everyday materials. To understand that materials can be grouped based on their physical properties.	• Sort objects based on the materials they are made from. • Group objects based on their properties. • Suggest ways to test materials for their properties. • Make predictions and recognise whether they were accurate. • Use their observations to answer questions. • Begin to recognise if a test is fair.	material, wood, plastic, glass, metal, water, rock, fabric, physical properties hard, soft, brittle, transparent, malleable, absorbent, opaque, rough, smooth, waterproof, tough data, group,	 
Materials: Uses of everyday materials	To know why objects are made from particular materials and to give examples of their suitability. To know that one material can be used for a range of purposes and to know that different materials can be used for the same purpose (and to give examples.) To know why certain materials are unsuitable for particular objects.	• Measure using non-standard units. • Recording results in a table. • Use data to answer a simple question. • Record results in a block graph • Recognise what the scientist Charles Mackintoshl was known for.	material, wood, plastic, glass, metal, water, rock, fabric, material, purpose, suitable, unsuitable, properties bend, stretch, push, pull, flexible, squash, twist, elastic record	
Plants: Introduction to plants	To identify a variety of common plants, and how they differ. To know that deciduous trees lose their leaves seasonally, but evergreen trees do not. To know the basic structure (including leaves, flowers (blossom), fruit, roots, bulb, seed, trunk, branches, stem) of a variety of common plants, including flowering plants and trees.	• Raise questions about plants and respond to suggestions on how to set up an investigation to answer a question. • Use a magnifying glass to observe the different parts of flowering plants. • Draw and label a diagram of a flowering plant. • Use an identification chart to name flowering plants. • Sort plants into groups based on specific criteria.	plants, evergreen, deciduous structure, leaves, flowers (blossom), fruit, roots, bulb, seed, trunk, branches, stem garden plants, wild plants, edible, growth, group, data, diagram, investigation, measure, observe, prediction, research	

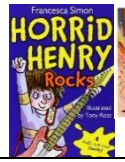
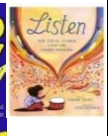
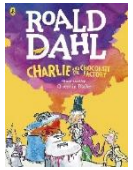
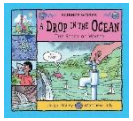
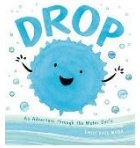
		• Use non-standard units to measure leaf length. • Recognise similarities and differences in seeds and bulbs. • Recognise that predictions do not always match observations. • Identify which plant parts can be eaten. • Recognise that scientific research into plants leads to important discoveries		
Plants: Plant growth	To know that seeds and bulbs grow into seedlings by producing roots and shoots. To know that seedlings grow into mature plants by developing parts such as roots, stems, leaves and flowers. To know that seeds need water and warmth to germinate and water, light and a suitable temperature for growth and health.	• Set up comparative tests. • Plan observations and measurements. • Use rulers to measure and record stem height. • Record plant growth data in a table. • Compare plant growth in different test conditions. • Use a magnifying glass to observe and compare plants. • Draw diagrams to represent stages of a plant's life cycle.	seed, bulb, seedling, shoot, root, mature, stem, leaf, flower, seed coat water, warmth, light, temperature, healthy, condition, wilt, energy, germinate, life cycle, comparative test, conclusion, diagram, measure, observe,	
Animals including humans: Life cycles and health	To know which offspring comes from which parent animal. To know the stages in some animal life cycles. To know that animals, including humans, need water, food and air to survive. To understand the importance of exercise, a balanced diet and hygiene for humans.	• Measure using simple equipment. • Record results in a table. • Use data to answer a simple question. • Research using secondary sources • • Recognise what the scientist Florence Nightingale was known for.	parent, adult, baby, child, offspring, height, growth, life cycle, survival, basic needs, butterfly, caterpillar, egg, frog, tadpole, froglet, frogspawn, lamb, sheep, live young water, food, air, exercise, fitness, balanced diet, carbohydrates, dairy, oils, fruit, vegetables, hygiene, germs, measure	   

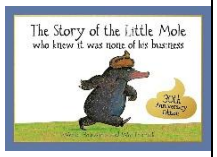
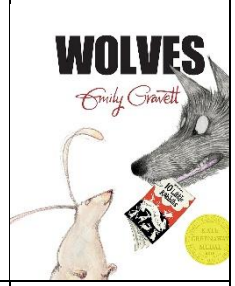
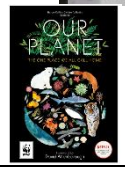
Lower Key stage 2 Cycle A				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts/ hook book**
Forces and space: Forces and magnets	To know the North and South poles of a magnet and understand that the opposite poles of a magnet attract one another and like poles repel one another. To know some uses of magnets. To know that friction is a contact force that acts between two surfaces to slow an object down. To know that magnetism is a non-contact force that affects objects containing magnetic metal. To know some examples of magnetic materials, including iron and nickel, and how they react to a magnet and each other.	• Use arrows and scientific vocabulary to show the direction of a contact force. • Use evidence to support conclusions. • Identify the variables to change, measure and control. • Write a method to explain how to use a magnet to sort and classify materials as magnetic or non-magnetic. • Label the axes of a bar chart. • Draw bars on a chart accurately. • Identify key information from a source. • Use more than one source to research a question.	attract, contact force electromagnet, force, friction, magnet magnetic material, magnetism non-contact force, non-magnetic material, north pole repel, south pole	
Animals including humans: Movement and nutrition	To know that animals can be grouped based on the presence of a skeleton and know the main bones in the body. To know that the skeleton in humans and some animals is used for movement, protection and support and to know that the muscular system in humans and some animals works with the skeleton for movement. To know that a balanced diet should include all food groups and know the main food groups (carbohydrates, protein, fats, fibre, vitamins, minerals and water) and their simple functions. To describe the diets of different animals.	• Record measurements of different bones and use the data to sort them into size order. • Describe some ways scientific research has improved the field of bionics/prosthetics, such as the choice of materials or linking their movement to muscles in the arm. • Find relevant data on food packaging and make numerical comparisons • Recognise what the scientist Marie Curie was known for.	balanced diet, bone, carbohydrate endoskeleton, exoskeleton fat, fibre, invertebrate, joint, mineral movement, muscle, nutrient protection, protein, skeleton support, vertebrate, vitamin, water	 
Materials: Rocks and soil	To know that rocks can be grouped based on their appearance or properties, (e.g. colour, texture, hardness, permeability.) These can determine their uses.	• Use a magnifying glass correctly to observe the appearance of a rock in detail.	absorbency, acid rain, bone clay, clay soil, crystal, earthworm	

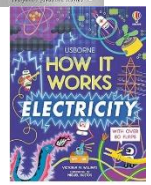
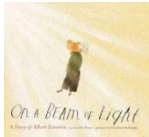
	To know that rocks may contain grains, crystals or fossils and these can be used to classify rocks. To know that soils are made from rocks and dead matter. To know that fossils can form from the remains of living things. To know that rocks can change over time (e.g. erosion, weathering).	• Use results to choose the appropriate rock type for a specific use, suggest a better choice of rock for a specific use and to predict how a rock will be affected by the weather. • Research and present information on fossil formation using a single source. • Use a model of the fossil record to determine the relative age of a fossil, to suggest how a living thing has changed over time and to suggest what living things were around in a certain era. • Draw and label the bars on a bar chart. • Accurately draw and label the layers of sediment in a sedimentation jar. • Recognise what the scientist Mary Anning was known for. •	era, fossil, fossil record, grain, hard, hardness, impermeable, igneous rock imprint, lava, loam soil, magma metamorphic rock, mineral molten rock, organic matter paelantologist, peaty soil permeable, rate, rock, sandy sandy soil, sediment, sedimentary sedimentation, silt, soft, soil	  
Energy: Light and shadows	To know that light travels from a source and name some sources. (e.g. the Sun, light bulbs and torches). To know that light is needed to see things and that dark is the absence of light. To know that light from the Sun can be dangerous and how to protect their eyes. To know that shadows change as a result of different factors: Changing the position of the light source/Changing the distances between the light source, object and surface. To know that shadows change position and length throughout the day as the Sun changes position in the sky.	• Recall what information needs recording to decide the number of columns in a results table and suggest suitable headings for the results table. • Record information in the correct columns. • Identify if a question is testable, explain why and plan ways to answer a testable question. • Identify and explain why something is an advantage or disadvantage of a method and suggest an improvement to the experiment. • I can describe patterns in data and quote values as evidence of patterns in data. • I can identify odd results that do not fit the pattern. • I can use patterns to make predictions for missing data	cast a shadow, dangerous light source, luminous non-luminous, opaque protect, reflect reflection, reflective (shiny) shadow, shadow puppet translucent, transparent	 
Plants: Plant reproduction	To understand the functions of the basic parts of a plant. To know that water is transported within a plant from the root, through the stem, to the leaves. To know that plants need water, light, air, nutrients and a suitable temperature for growth and health.	• Pose relevant questions. • Design and record in results tables. • Plan a simple enquiry. • Complete, read and interpret data in a bar chart. • Identify and suggest changes to an enquiry. • Use results to draw conclusions. • Recognise what the scientist Kelsey Byers was known for.	absorb, air, animal dispersal, carrying, conclude disperse, dropping, eating evaluate, female, flower fruit, germination improve, leaves, male nutrients, petal, pollen	

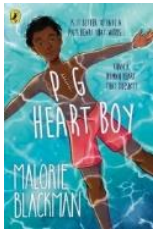
	To know the life cycle of a plant from seed to mature plant.	•	pollination, roots, soil seed, seed formation shaking, space stem/trunk, sunlight, support testable, transport, water water dispersal, wind dispersal	
	To know that flowers are the reproductive organ of a plant. To know that the process of pollination is the transfer of pollen to the female (part of the) flower. To know that the process of seed formation is the growth of a seed after pollination. To know some different methods of seed dispersal and the benefits of each.	.		

Lower Key stage 2 Cycle B				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts/ hook book**
Energy: Electricity and circuits	To know that all electrical appliances need a power source, including batteries or mains electricity. To know that an electrical circuit needs a complete path for the electrical charge to flow through. To know that some materials allow electrical charge to pass through them quickly- electrical conductors (e.g. metals). To know that some materials do not allow electrical charge to pass through them easily -electrical insulators (e.g wood and plastic). To know the main components in a simple series circuit and explain how closed and open switches effects a circuit. To understand the relationship between bulb brightness and the number of bulbs in a circuit. To know the precautions for working safely with electricity.	• Draw a results table and record a range of appliances under the correct headings 'Mains' or 'Batteries'. • Identify and draw simplified electric circuit symbols and use these to draw a simplified circuit diagram. • Write a method for the investigation that considers appropriate equipment, ordering clearly written steps and considering safety. • Pose questions relating to bulbs in an electrical circuit. • Explain why a selected question is testable. • Suggest that new inventions will change safety advice. • Recognise what the scientist Thomas Edison was known for. •	ammeter, appliance, battery, bulb buzzer, cell, circuit, component electrical conductor, electrical insulator, electricity hazard, mains, material motor, power source precaution, property safety, series circuit switch, wire	 
Energy: Sound and vibrations	To understand that sound is a result of vibrations that travel from objects through mediums to the ear. To know that an insulating material reduces the amount of vibrations that pass through it and this can be used to protect the ears from damaging sounds. To know that different materials provide different amounts of insulation against sound	• To observe closely how different instruments create a sound. • Research how whales and dolphins communicate underwater. • Present results using a bar chart. • Suggest which variables to measure and for how long. • Design simple results tables.	qir, decibels (dB), decibel meter ear, eardrum, ear protectors gas, hertz (Hz), high pitch insulator of sound liquid, loud, low pitch, matter medium, musical instrument pitch, quiet, solid	

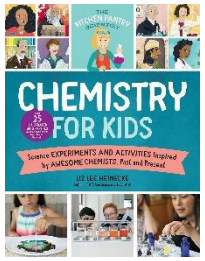
	To know a variety of ways to change the pitch or volume of a sound. -quicker vibrations cause higher-pitched sounds and slower vibrations cause lower-pitched sounds. -stronger vibrations cause louder sounds and weaker vibrations cause quieter sounds.	• Identify when results or observations do not match predictions. • Recognise what the artist Aristotle was known for.	sound, sound proofing vibration, volume	 
Materials: States of matter	To know that all substances around us can exist as solids, liquids and gases. To know that water can exist as a solid, a liquid or a gas. To know the property of a solid- keeps its shape unless a force is applied to it. To know the property of a liquid- can flow freely and take on the shape of a container. To know the property of a gas- does not have a fixed shape and can escape from an unsealed container. To know that heating causes solids to turn into liquids (melting) and liquids to turn into gases (evaporating). To know that cooling causes gases to turn into liquids (condensing) and liquids to turn into solids (freezing). To know that the melting point of water is zero degrees Celsius and the boiling point of water is 100 degrees Celsius. To know that water flows around the world in a continuous process called the water cycle and to explain the following - evaporation - condensation - precipitation To know that the rate of evaporation increases as temperature rises.	• Ask relevant questions. • Use results to draw simple conclusions. • Use thermometers to take accurate measurements. • Make predictions for new values. • Record findings using labelled diagrams. • Research using more than one source. • Greta Thunberg	boiling point, climate change compress, condensation condensing, condensing point drought, evaporating evaporation rate, flood force, freezing freezing point, gas gaseous, liquid matter, melting melting point precipitation, rate, solid state, steam, temperature thermometer, the water cycle volume, water vapour	  
Animals including humans:	To know the main organs of the human digestive system (mouth, teeth, tongue, oesophagus, stomach, small and large intestines) and describe their simple functions.	• Evaluate a strength or weakness of the digestive system model. • Describe an example of evidence that can be used to study teeth.	absorb, canine, carnivore digest, faeces, food chain herbivore, incisor, large intestine	

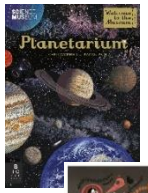
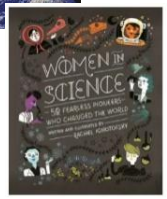
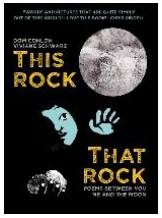
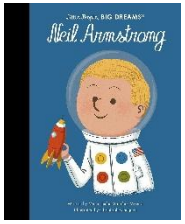
Digestion and food	To know the different types of human teeth (incisor, canine, premolar and molar) and their simple functions. To describe the teeth of carnivores and herbivores, and understand why they are different. To know that teeth can be damaged, including the effect of sugary and acidic food. To know that it is important to brush teeth twice a day, make good food choices and visit the dentist regularly. To know that producers make their own food. To know that food chains begin with a producer followed by consumers, and arrows to show the energy passed on.	• Identify some of the variables that need to be kept the same, predict an outcome and identify limitations to the experiment. • Recall that scientific research needs repeated results before use in society. • Identify trends in a predator-prey graph. • Draw a results table that has space for observations about different poo samples.	molar, mouth, oesophagus omnivore, predator, premolar prey, producer, saliva, small intestine stomach	 
Animals: Classification and changing habitats	To know that vertebrates are animals which have a backbone and invertebrates are animals which do not have a backbone. To know that plants can be grouped into flowering or non-flowering varieties. To know that flowering plants include grasses and non-flowering plants includes ferns and mosses. To know that there are five main vertebrate groups: birds, mammals, reptiles, amphibians and fish. To know that invertebrate groups include snails, slugs, worms, spiders and insects. To know that humans can have both a positive and negative impact on the environment.	• Record data in different ways. • Apply and create classification keys. • Make careful observations. • Make and use classification keys. • Present information in different ways. • Research using an information sheet. • Recognise what the scientist Rachel Carson was known for. •		 

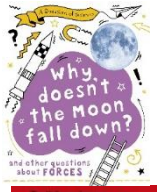
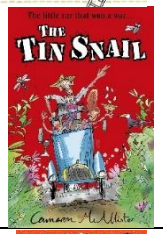
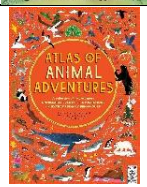
Upper Key stage 2 Cycle A				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts/ hook book**
Energy: Circuits, batteries and switches	To know a wider variety of components in a series circuit (including buzzer and motor). To know the conventions used to draw circuit diagrams, including the recognised symbols for common components and using straight lines To know that the voltage of a circuit can be changed and how this affects bulb brightness (or buzzer volume).	• Draw circuit diagrams with straight lines and using standard circuit symbols. • Design a results table with an appropriate number of columns and headings with units. • Identify the changed, measured and control variables in an enquiry to plan a method.	ammeter, appliance, battery bulb, buzzer, cell, circuit circuit diagram, component current, electricity, motor power source, resistance switch, voltage, voltmeter, wire	
Energy: Light and reflection	To understand relationships between light sources, objects and shadows and know that light travels in a straight line from a light source. To understand that luminous objects are seen as a result of light directly entering the eye, whereas non-luminous objects reflect light into the eye. To know that shiny surfaces reflect light and when light is reflected off a surface, its direction changes. To know that mirrors and periscopes work using reflection of light on smooth surfaces. To understand why shadows have the same shape as the objects that cast them and understand how and why the distance between the object and the screen affects the size of the shadow.	• Make observations about the properties of light. • Use my observations as evidence to support conclusions about light. • Draw ray diagrams. • Pose testable questions in response to observations. • Record my measurements as a line graph. • Use my line graph to extrapolate data and make predictions about missing values. • Recall various jobs or inventions that use mirrors and reflection. • Recognise what the scientist Percy Shaw was known for.	cast, incoming ray, light ray light source, luminous, mirror non-luminous, opaque, periscope pupil, ray diagram, reflected ray reflective, shadow, straight	

Animals including humans: Circulation and health	To know the main parts of the human circulatory system (heart, blood vessels and blood) and explain the role of each. To understand the relationships between different organ systems. To understand the impact of diet, exercise, drugs and lifestyle on the way a body functions. To know that exercise increases heart rate and that the heart rate is the number of beats per minute.	• Evaluate the trustworthiness of secondary sources that provide health advice. • Evaluate the model blood by considering a strength and a weakness when representing blood and suggesting improvements. • Compare class values and recognise when they do not match. • Use identified patterns to predict new values. • Write a method for an enquiry with consideration of equipment, the different versions of the changed variable and how to complete the measured variable. • Choose a suitable title and axis labels with units for the line graph and plot points on the line graph.	balanced diet, blood bloodstream, blood vessels carbon dioxide, circulatory system diet, drug, exercise, fitness, health heart, heart rate, lifestyle, lungs mass, nutrient, oxygen, pulse pump (verb), rate, resting heart rate transport, water	
Living things: Classifying Big and small	To know that 'organism' is a term used to refer to an individual living thing. To know that micro-organisms are incredibly small and cannot usually be seen by the naked eye. To know the characteristics of the different groups of vertebrates and commonly found invertebrates.	• Use a classification key to group and identify organisms. • Make a simple classification key. • Recognise the work of Carl Linnaeus	amphibian, binomial system bird, characteristic, classify classification key cold-blooded, conifer, exoskeleton fern, fish, flowering plant, insect invertebrate, life process, Linnaean system, mammal, micro-organism, microscopic, moss, organism, reptile snail, spider, vertebrate, warm- blooded, worm	
Living things: Evolution and inheritance	To know that living things have changed over time. To know that fossils provide us with information about living things that inhabited the Earth millions of years ago. To know that characteristics are passed from parents to their offspring, but that all offspring vary from their parents. To know that over time, variation in offspring can affect animals' chances of survival in particular environments.	• Sort variation as environmental, inherited or a mixture of both. • Evaluate a method by recalling variables that were effectively kept the same and those that were harder to control. • Comment on the reliability of the results and the degree of trust.	adaptation, ancestor, characteristic competition, environmental evidence, evolution, extinct fossil, gene, habitat, inherit natural selection, offspring peer review, population reproduce, scientific theory selective breeding, species specimen, survival survival of the fittest, variation	

	To know that animals and plants have adapted to suit their environment over many millions of years and that this process can be called evolution.	• Consider how evidence is used to form theories and the degree of trust the evidence offers • Recognise the work of Charles Darwin and Alfred Wallace		

Upper Key stage 2 Cycle B				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts/ hook book**
Materials: Properties and changes	To describe a broader range of materials and their properties, including hardness, solubility, transparency, conductivity and response to magnets.	• Evaluate the hardness test to determine the degree of trust in the results. • Plan and draw a table of results. • Write a detailed, organised and easy to follow method. • Write a prediction using prior knowledge of the states of matter. • Analyse observations about rusting and use them to support a conclusion. • Measure accurately in centimetres.	burning, change of state circumference, condensing conductor, dissolve electrical conductivity evaporating, freezing hard, hardness, insulator, irreversible change, light intensity, light meter melting, mixture, opaque, property reversible change, rust, rusting, soft states of matter, trustworthy thermal conductivity, translucent transparency, transparent	
Materials: Mixtures and separation	To know that some substances will dissolve in a liquid to form a solution and know factors. that affect the time taken to dissolve, including temperature and stirring. To understand that dissolving, mixing and changes of state are reversible changes. To understand that some changes result in the formation of new materials and that these are usually irreversible. (e.g. burning, rusting, the action of acid on bicarbonate of soda.) To know that some liquids and solids can be separated using sieving, filtering and evaporation and to describe these processes.	• Research a mixture to find out what substances it is made from. • Draw and annotate a diagram to explain how sieving separates a solid-solid mixture. • Identify and justify which type of enquiry to use to answer my testable question. • Identify solutions by observing and describing their appearance. • Suggest which variables to change, measure and control when investigating how temperature affects the time taken to dissolve. • Choose which measurements to take and how long to take them for.	control variable, crystallising dissolve, evaporation evaporation method, filtering insoluble, mixture, particle sieve, sieving, soluble solution, variable	

Forces and space: Earth and Space	The sun -To know that the Sun is a star at the centre of our solar system and that the Sun, Earth and Moon are approximately spherical bodies. To know the names, order and relative positions of the planets and other main celestial bodies. The Earth -To know that the Earth and other planets orbit around the Sun. -To know that the tilt of the Earth and its orbit around the Sun causes the seasons. -To understand how the Earth's rotation causes day and night and the apparent movement of the Sun across the sky. The moon -To know that the Moon orbits around the Earth. -To know that a moon is a celestial body that orbits a planet and give examples of moons that orbit other planets.	• Pose and identify testable questions about the movement of the celestial bodies in our Solar System. • Use a model to represent the Solar System. • Design and draw a table to record data on moons. • Accurately draw day and night and seasons diagrams. • Calibrate a sundial using a compass and torch and use it to measure time. • Analyse patterns in temperature data for the Earth and use them to predict temperature values for the Earth in the future. • Recognise what the scientists Galileo, Neil Armstrong and Valentia Tereshlova and Mae Jemison were known for.	artificial satellite, axis, calibrate celestial bodies, climate change day, daytime (daylight) data, Earth, elliptical, face first quarter moon, force full moon, gnomon gravity, horizon, Jupiter, last quarter moon, Mars, Mercury, midday moon, natural satellite, Neptune new moon, night (nighttime)	   
Forces and space: Unbalanced forces	To know that gravity is a non-contact force that pulls objects together and to know that unsupported objects fall towards the Earth because of gravity. To know that air resistance and water resistance are both types of friction and that friction, air resistance and water resistance act in the opposite direction to a moving object.	• Analyse predictions, data and anomalies to write a conclusion. • Plan a fair test to investigate air resistance. • Write a method. • Evaluate a method and judge the degree of trust. • Design a results table.	aerodynamics, air resistance, amplify balanced, contact force, distance effort, force, friction, gear, gravity lever, load, machine, mass, matter non-contact force, pivot, pulley streamlining, surface area unbalanced, water resistance	

	To know that when forces are imbalanced, the speed, shape or direction of an object changes and when forces are balanced the speed, shape or direction of an object stays the same. To know that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect and to explain about how different surfaces	• Calculate the mean average from repeat data. • Draw and annotate a diagram. • To draw an accurate line graph. • Recognise what the scientist Isaac Newton was known for.		 
Animals including humans: Life cycles and reproduction	To describe the human life cycle, including the stages of growth and development (baby, toddler, child, teenager, adult, elderly). To describe changes that occur during puberty (in boys and girls). To know that a life cycle shows the changes an animal or plant goes through until the reproduction of a new generation when the cycle starts again. To know that all living things must reproduce for the species to survive and that sexual reproduction requires two parents, whereas asexual reproduction only requires one parent. To know that gestation periods vary across mammals	• Observe and compare equivalent parts in different flowers. • Research the life cycles of different mammals. • Pose questions to compare the life cycles of different birds. • Suggest how one temperature may affect egg hatching. • Use data to describe a relationship and make predictions. • Represent root growth over time on a line graph. • Recognise what the scientist David Attenborough is known for.	adolescence, adult, amphibian asexual reproduction, bird, birth bulb, carnivore, characteristic chrysalis, cocoon, cuttings, egg estimating, extrapolating, fertilisation, fledgling, flowering stage, four-legged tadpole four-stage life cycle, frog, froglet germination stage, gestation gills, hatch, hatchling, herbivore incubation, infancy, insect juvenile, larva, leaf growing stage life cycle, line of best fit, lungs mammal, mating, metamorphosis nest, nestling, newborn, nymph offspring, ovule, pollen, pollination pupa, reproduction, seed dispersal seed stage, seedling stage, seed sexual reproduction, species tadpole, three-stage life cycle tuber, two-legged tadpole