

## Science at St Alban's CE Aided Primary (v07/23 1)

### Intention

Science at St Alban's School aims to give pupils the skills to investigate and explore. Children are naturally curious. Science at St Alban's should nurture this curiosity and allow them to ask questions and develop the skills they need to answer those questions.

Science should be fun and engaging with hands on and practical opportunities in the majority of lessons.

Science should be relevant to the children and should inspire them to ask more questions or answers.

We need science to be collaborative and challenging in order that children understand that problems need solutions.

We need science to be cross-curricular and memorable so that children can make links, develop creativity, resilience, problem solving and critical thinking skills.

We will develop Science capital through which we can think about factors that lead pupils to make decisions regarding their future as well as continued engagement outside the classroom and school, developing an interest, a passion for science that leads to intrinsic motivation to learn more.

### Pupil approach: Working as a scientist, pupils will...

- **Ask questions** that can be answered using a scientific enquiry
- **Make predictions** using prior knowledge to suggest what will happen in an enquiry
- **Set up tests**, deciding on the method and equipment to use when carrying out an enquiry
- **Observe and measure**
- **Record data**, using own methods to note observations and measurements
- **Interpret and communicate** results using information from the data to say what you have found out
- **Evaluate** on the success of the enquiry approach and identifying further questions for enquiry

### Learning journey structure/steps

#### 6 step enquiry

1. Motivate ('hook') and set scope of enquiry
2. Collect information
3. Formulate questions
4. Draw own conclusions
5. Devise experiments
6. Develop conclusions

### Teaching approach: non-negotiables for teachers

- The **progression of skills for working scientifically** are developed through the year groups and scientific enquiry skills are of key importance within lessons.
- To acquire a breadth of science skills, children need to learn to carry out a **variety of investigations**. Over the year, introduce **fair testing; observing over time; pattern seeking; identifying and classifying; and research**
- Ensure each child has a copy of working scientifically poster in their science books which they annotate as appropriate
- Science **technical vocabulary** must be displayed, spoken and used by all learners.
- **Wonderwall**- children to produce their own questions to explore and answer
- **Risk assessment**-: Identify the hazards; minimize high risks so that activity can be carried out; actively involve children in planning for risk

### Key Resources/documents for planning

Kapow Primary (school subscription)  
<https://www.kapowprimary.com/>

HIAS Science Moodle -  
<https://science.hias.hants.gov.uk/>

Developing Experts -  
<https://www.developingexperts.com/>

## National Curriculum Map

### St Alban's CE Aided Primary School Science Overview

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	Seasonal Changes ____*	Everyday Materials ____*	Sensitive Bodies ____*	Comparing Animals ____*	Introduction to Plants ____*	Making Connections
Year 2	Habitats- Living Things ____*	Microhabitats ____*	Use of Everyday Materials ____*	Life Cycles and Health ____*	Plant growth ____*	Making Connections
Year 3	Movement and Nutrition ____*	Forces and Magnets ____*	Rocks and Soil	Light and Shadows	Plant Reproduction	Making Connections
Year 4	Digestion and Food ____*	Electricity and circuits ____*	Classification and changing habitats	States of matter	Sound and vibrations	Making Connections
Year 5	Materials- Mixtures and Separation ____*	Properties and changes ____*	Earth and space	Life Cycles and Reproduction	Imbalanced Forces	Human Timeline
Year 6	Classifying Big and Small ____*	Light and Reflection ____*	Evolution and Inheritance	Circuits, Batteries and Switches	Circulation and Environment	Making Connections

## Implementation

### Science knowledge – Year 1

<b>Unit: Seasonal changes (6 lessons)</b>		
<b>Forces, Earth and Space</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Reflecting on their own experiences, children learn about the four seasons and the weather associated with each. Pupils explore how seasonal changes affect trees, daylight hours and our choices about outfits. They plan and carry out their own weather reports, considering the knowledge required for this job</p>	<p><b>Progression of Knowledge</b></p> <p>To know 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), petals, fruit, roots, bulb, seed, trunk, branches, stem) of a variety of common plants, including flowering plants and trees.</p>
<b>Unit: Everyday Materials (6 lessons)</b>		
<b>Materials</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Identifying the difference between objects and materials, children explore their surroundings to find examples of each. They scientifically investigate the properties of materials and begin to sort and group materials by their properties. Pupils discover that some materials are a result of scientific experimentation and that some materials can be recycled to conserve resources</p>	<p><b>Progression of Knowledge</b></p> <p>To know that objects are items or things. 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. To describe the physical properties of a variety of everyday materials. To understand that materials can be grouped based on their physical properties.</p>
<b>Unit: Sensitive bodies (6 lessons)</b>		
<b>Animals, Including Humans</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Familiarising themselves with the basic parts of the human body, children investigate their senses through stimulating experiences that highlight how we interact with the world around us. They develop an understanding of the importance of our senses and how science can support those who have lost sensory function</p>	<p><b>Progression of Knowledge</b></p> <p>To know a variety of common animals (including fish, amphibians, reptiles, birds and mammals). To know the main body parts of common animals (arms, legs, wings, tails, fins, head, trunk, horns/tusks, shell) 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 eyes are used for sight, the nose is used for smell, ears are used for hearing, the tongue and mouth are used for taste and the skin is used for touch.</p>

<b>Unit: Comparing animals (6 lessons)</b>		
<b>Animals, Including Humans</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Studying both local and global animals, children recognise common features and use this information to make comparisons and begin to classify animals.</p> <p>Pupils collect data by surveying class pets, to then explore ways in which this information can be recorded.</p> <p>They develop their understanding of classification by comparing the dietary habits of different animals and use their knowledge and imaginations to take on the role of a zookeeper.</p>	<p><b>Progression of Knowledge</b></p> <p>To know that a carnivore is an animal that eats other animals and to give some examples.</p> <p>To know that a herbivore is an animal that eats only plants and to give some examples.</p> <p>To know that an omnivore is an animal that eats both animals and plants, and to give some examples</p>
<b>Unit: Introduction to plants (6 lessons)</b>		
	<p><b>In this unit of work, pupils learn....</b></p> <p>Identifying the key features of a plant, children describe important structures and make comparisons between different plants. Pupils use investigative skills to record the growth of a plant over time and begin to reflect on factors that will affect its development.</p> <p>They begin to explore how plants are used by humans and grow their own herb garden</p>	<p><b>Progression of Knowledge</b></p> <p>To know a variety of common plants, and how they differ.</p> <p>To know that deciduous trees lose their leaves seasonally, but evergreen trees do not.</p> <p>To know the basic structure (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem) of a variety of common plants, including flowering plants and trees.</p> <p>To begin to understand how plants grow and change over time.</p>
<b>Unit: (6 lessons)</b>		
<b>Making Connections</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>This unit aims to bring together pupils' science learning from the other units and help them to see connections between the key areas.</p>	

## Science knowledge – Year 2

<b>Unit: Habitats (6 lessons)</b>		
<b>Living Things and Their Habitats</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Considering the life processes that all living things have in common, pupils classify objects into alive, was once alive or has never been alive.</p> <p>Pupils explore global habitats, naming plants and animals that can be found there.</p> <p>They learn how a range of different living things depend on each other for food or shelter.</p> <p>Pupils explore this further by creating food chains to show the sequence that living things eat each other for energy to grow and stay healthy.</p>	<p><b>Progression of Knowledge</b></p> <p>To begin to understand some of the life processes, including movement, reproduction, sensitivity, growth, excretion and nutrition.</p> <p>To know the difference between things that are living, dead, and things that have never been alive, using some of the life processes.</p> <p>To know a variety of plants and animals and describe some differences.</p>
<b>Unit: Microhabitats (6 lessons)</b>		
<b>Living Things and Their Habitats</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Developing their understanding of scientific enquiry, pupils learn that scientists use a range of skills to answer questions.</p> <p>They discover that microhabitats provide what minibeasts need to survive and carry out a survey to find out where different minibeasts live in the school grounds.</p> <p>They practise asking scientific questions and follow a method to investigate which conditions woodlice prefer.</p> <p>Pupils explore the job role of a botanist by identifying flowering plants.</p>	<p><b>Progression of Knowledge</b></p> <p>To name a variety of habitats, including woodland, ocean, rainforest and seashore.</p> <p>To know that a habitat is the environment where an animal or plant lives/ grows, because it provides what they need to survive.</p> <p>To know that a micro-habitat is a very small habitat (e.g. stones, logs and leaf litter).</p> <p>To know that living things depend upon each other (e.g. for food, shelter.)</p> <p>To understand that a food chain can be used to show how animals obtain food from eating either plants and/or other animals.</p>
<b>Unit: Uses of everyday materials (6 lessons)</b>		
<b>Materials</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Reflecting on their knowledge of different materials, children begin to explain why materials are used in certain contexts.</p> <p>They develop enquiry skills to investigate the properties of materials and explore the science of inventing new ones.</p>	<p><b>Progression of Knowledge</b></p> <p>To know why objects are made from particular materials and to give examples of their suitability.</p> <p>To know that one material can be used for a range of purposes (and to give examples.)</p> <p>To know that different materials can be used for the same purpose (and to give examples.)</p> <p>To know why certain materials are unsuitable for particular objects.</p>

<b>Unit: Life cycles and health (6 lessons)</b>		
	<b>In this unit of work, pupils learn....</b> Studying the life cycles of various animals, children learn what animals need to survive and how they change over time. Pupils collect data that allows them to observe changes in their peers, while also developing their ability to take measurements and record data. They consider the role of expert scientific knowledge in careers that inform people to make healthy choices.	<b>Progression of Knowledge</b> To know that a force must be applied to change the shape of a solid object. To know that solid objects can be squashed, bent, twisted or stretched. To know that different solid objects may take a different amount of force to change shape.
<b>Unit: Plant growth (6 lessons)</b>		
	<b>In this unit of work, pupils learn....</b> Using their prior knowledge of important plant structures, children explain what factors are needed for successful growth and compare how those needs vary across different plants. They grow plants from seeds and bulbs to ascertain the needs for initial development and compare this to the survival needs of plants in later growth phases. Pupils take their own measurements and reflect on historical examples to understand how conclusions can be drawn	<b>Progression of Knowledge</b> 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, that may include stems/trunks, leaves, flowers and fruits. To know that seeds need water to germinate. To know that plants need water, light and a suitable temperature for growth and health.
<b>Unit: (Making Connections)</b>		

## Science knowledge – Year 3

<b>Unit: Movement and nutrition (6 lessons)</b>		
<b>Animals, Including Humans</b>	<b>In this unit of work, pupils learn....</b> Studying the human skeleton, children identify key bones and compare them to other animals explaining the role within the body. Pupils explore how changes in muscles result in movement and the implications these discoveries have in the scientific development of prosthetic limbs. They study how energy is used by the body, what constitutes a balanced diet in humans and how research contributes to nutritionist expertise.	<b>Progression of Knowledge</b> To know that animals can be grouped based on the presence of a skeleton. To know that the skeleton in humans and some animals is used for movement, protection and support. To know that the muscular system in humans and some animals works with the skeleton for movement. To know the main bones in the body.

<b>Unit: Forces and magnets (6 lessons)</b>		
<b>Forces, Earth and Space</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Investigating the movement of vehicles on different surfaces, children learn about the impact of friction and compare uses and drawbacks.</p> <p>They broaden their experience in writing scientific conclusions and recording data as they investigate contact and non-contact forces.</p> <p>Pupils explore the properties of different magnets and use this to understand their uses.</p>	<p><b>Progression of Knowledge</b></p> <p>To know some examples of contact and non-contact forces.</p> <p>To know that some forces are a result of contact between two surfaces, but some forces can act at a distance (e.g. magnetism).</p> <p>To know the North and South poles of a magnet.</p> <p>To know some examples of magnetic materials, including iron and nickel, and how they react to a magnet and each other.</p> <p>To know some different examples of magnets, including bar, horseshoe, button and ring,</p> <p>To know some uses of magnets.</p> <p>To know that friction is a contact force that acts between two surfaces to slow an object down.</p> <p>To know that magnetism is a non-contact force that affects objects containing magnetic metal.</p> <p>To understand that the opposite poles of a magnet attract one another and like poles repel one another.</p>
<b>Unit: Rocks and soil (6 lessons)</b>		
<b>Materials</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Studying rocks and their properties, children learn that rock properties support classification and tell us about how rocks were formed.</p> <p>Pupils look at the work of palaeontologists to learn about how fossils form and use models to explain the rock cycle.</p> <p>They plan an investigation to test rocks for particular uses and form conclusions about which soil type is most suitable for UK farmers.</p>	<p><b>Progression of Knowledge</b></p> <p>To know that rocks can be grouped based on their appearance or properties, (e.g. colour, texture, hardness, permeability.)</p> <p>To know that rocks may contain grains, crystals or fossils.</p> <p>To know that grains and crystals appear differently and can be used to classify rocks.</p> <p>To know that soils are made from rocks and dead matter.</p> <p>To understand the relationship between the properties of rocks and their uses.</p> <p>To know that fossils can form from the remains of living things.</p> <p>To know that rocks can change over time (e.g. erosion, weathering).</p>
<b>Unit: Light and shadows (6 lessons)</b>		
<b>Energy</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Identifying examples of luminous objects, children learn about how light travels around us and how that enables us to see.</p> <p>Children investigate reflection and shadow formation, creating their own shadow puppets and exploring how shadows can be used to entertain in the arts.</p>	<p><b>Progression of Knowledge</b></p> <p>To know that light travels from a source (e.g. the Sun, light bulbs and torches).</p> <p>To know that light travels in a straight line from a light source.</p> <p>To know that light is needed to see things and that dark is the absence of light.</p>

	<p>They look at examples of pivotal scientific discoveries and the scientific methods that led to those successes.</p>	<p>To know that light from the Sun can be dangerous and how to protect their eyes.</p> <p>To know that materials reflect light.</p> <p>To know that light is reflected uniformly from a shiny surface, such as a mirror.</p> <p>To know that shadows are formed when the light from a light source is blocked by an opaque object.</p> <p>To understand how and why shadows change.</p> <p>To know that shadows change position and length throughout the day as the Sun changes position in the sky.</p>
<b>Unit: Plant reproduction (6 lessons)</b>		
<b>Plants</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Building on their prior knowledge of plant structures, children describe the functions of named parts and use evidence to explain their significance in plant development. Pupils investigate further factors that may affect the growth of plants and compete with their peers to disperse seeds in a variety of ways.</p> <p>They explore how seeds vary and define the type of plant they are studying, as well as looking at how seed shapes have inspired modern technologies</p>	<p><b>Progression of Knowledge</b></p> <p>To understand the functions of the basic parts of a plant and the relationship between structure and function.</p> <p>To know that water is transported within a plant from the root, through the stem, to the leaves.</p> <p>To know that plants need water, light, air, nutrients/fertilizer and a suitable temperature for growth and health.</p> <p>To understand that the needs for growth and health vary from plant to plant.</p> <p>To know the life cycle of a plant from seed to mature plant.</p> <p>To know that flowers are the reproductive organ of a plant.</p> <p>To know that the process of pollination is the transfer of pollen to the female (part of the) flower.</p> <p>To know that the process of seed formation is the growth of a seed after pollination/fertilisation.</p> <p>To know some different methods of seed dispersal and the benefits of each.</p>
<b>Unit: (Making Connections)</b>		

## Science knowledge – Year 4

<b>Unit: Digestion and Food</b>		
<b>Animals, Including Humans</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Digestion and food (6 lessons) Using models, children describe the function of key organs in the digestive system. Pupils identify the types of human teeth to create their own model and investigate factors that impact our dental health. They compare human teeth to other animals' and consider this in the light of prior knowledge about predators, prey and food chains. Children take on the role of a naturalist investigating animal faeces for clues about diet, digestion and dentition.</p>	<p><b>Progression of Knowledge</b></p> <p>To know the main organs of the human digestive system (mouth, teeth, tongue, oesophagus, stomach, small and large intestines) and describe their simple functions.</p> <p>To know the different types of human teeth (incisor, canine, premolar and molar) and their simple functions.</p> <p>To know that teeth can be damaged, including the effect of sugary and acidic food.</p> <p>To know that it is important to brush teeth twice a day, make good food choices and visit the dentist regularly.</p> <p>To describe the teeth of carnivores and herbivores, and understand why they are different.</p> <p>To know that predators hunt for their food and prey are the animals being hunted.</p> <p>To know that producers make their own food.</p> <p>To know that food chains begin with a producer followed by consumers, and arrows to show the energy passed on.</p>
<b>Unit: Electricity and circuits (6 lessons)</b>		
<b>Energy</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Exploring appliances in their setting that use electricity, children learn how to work with electricity safely and build circuits.</p> <p>Pupils investigate electrical conductors and insulators and explore the relationship between the number of cells and bulb brightness.</p> <p>Real scenarios and historical discoveries inform children about scientific progression and home safety.</p>	<p><b>Progression of Knowledge</b></p> <p>To know that all electrical appliances need a power source, including batteries or mains electricity.</p> <p>To know that an electrical circuit needs a complete path for the electric charge to flow through.</p> <p>To know the main components in a simple series circuit.</p> <p>To know the precautions for working safely with electricity.</p> <p>To know that some materials allow electric charge to pass through them easily and these are known as electrical conductors (e.g. metals).</p> <p>To know that some materials do not allow electric charge to pass through them and these are known as electrical insulators (e.g wood and plastic).</p> <p>To know that metals are used for cables and wires because they are good conductors of electricity.</p> <p>To know that plastic is used to cover cables and wires because it is a good insulator.</p>

		<p>To understand that an open switch breaks a series circuit so the components will be off.</p> <p>To understand that a closed switch completes a series circuit so the components will be on.</p> <p>To understand the relationship between bulb brightness and the number of cells in a circuit.</p>
<b>Unit: Classification and changing habitats (6 lessons)</b>		
<b>Living things and their habitats</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Identifying different ways living things can be grouped, children make classification keys to explore which grouping methods are most effective.</p> <p>Pupils study ways that habitats may change over time and understand that humans can have both positive and negative effects on their surroundings.</p> <p>They play the role of naturalists and review the impact of conservation programmes</p>	<p><b>Progression of Knowledge</b></p> <p>To know that living things can be grouped in different ways.</p> <p>To know that a classification key can be used to group and identify plants and animals.</p> <p>To know that vertebrates are animals which have a backbone and invertebrates are animals which do not have a backbone.</p> <p>To know that plants can be grouped into flowering or non-flowering varieties.</p> <p>To know that flowering plants include grasses and non-flowering plants includes ferns and mosses.</p> <p>To know that there are five main vertebrate groups: birds, mammals, reptiles, amphibians and fish.</p> <p>To know that invertebrate groups include snails, slugs, worms, spiders and inthings</p> <p>To know that habitats can change throughout the year and this can be dangerous for living things.</p> <p>To know that humans can have both a positive and negative impact on the environment.</p>
<b>Unit: States of matter (6 lessons)</b>		
<b>Materials</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Investigating the properties of solids, liquids and gases, children learn about the different states of matter.</p> <p>They explore changes of state using relatable examples and use this to explain changes to water through the water cycle.</p> <p>Pupils investigate the relationship between temperature and rate of evaporation while broadening their experience of working scientifically</p>	<p><b>Progression of Knowledge</b></p> <p>To know that heating causes solids to turn into liquids (melting) and liquids to turn into gases (evaporating).</p> <p>To know that cooling causes gases to turn into liquids (condensing) and liquids to turn into solids (freezing).</p> <p>To know that water can exist as a solid, a liquid or a gas.</p> <p>To know that the melting point of water is zero degrees Celsius and the boiling point of water is 100 degrees Celsius.</p> <p>To know that water flows around the world in a continuous process called the water cycle.</p>

		<p>To know that in the water cycle, evaporation is when bodies of water are heated and turn into water vapour.</p> <p>To know that in the water cycle, condensation is the process of water vapour cooling to form water droplets in clouds, which can result in precipitation.</p> <p>To know that the rate of evaporation increases as temperature rises.</p>
<b>Unit: Sound and vibrations (6 lessons)</b>		
<b>Energy</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Exploring different ways of producing sounds, children learn about the relationship between vibrations and what they hear.</p> <p>They use examples of echolocation to develop their understanding of how sound travels between objects and investigate the role of insulation to protect our ears.</p> <p>Pupils explore how pitch and volume can be altered and make their own musical instruments to demonstrate these principles</p>	<p><b>Progression of Knowledge</b></p> <p>To know that vibrations from sounds travel through mediums to the ear.</p> <p>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.</p> <p>To know that different materials provide different amounts of insulation against sound.</p> <p>To understand that sound is a result of vibrations.</p> <p>To know a variety of ways to change the pitch or volume of a sound.</p> <p>To know that quicker vibrations cause higher-pitched sounds and slower vibrations cause lower-pitched sounds.</p> <p>To know that stronger vibrations cause louder sounds and weaker vibrations cause quieter sounds.</p> <p>To know that sounds get fainter as the distance from the sound source increases.</p>
<b>Unit: (Making Connections)</b>		

## Science knowledge – Year 5

<b>Unit:</b> Mixtures and separation (6 lessons)		
<b>Materials</b>	<b>In this unit of work, pupils learn....</b> Pupils explore different types of mixtures and the different methods that can be used to separate them. They dissolve a range of substances, identify different solutions and investigate how temperature affects the time taken to dissolve. They design and create a water filter, sieve soil and evaporate solutions.	<b>Progression of Knowledge</b> To describe a broader range of materials and their properties, including hardness, solubility, transparency, conductivity and response to magnets.
<b>Unit:</b> Properties and changes (6 lessons)		
<b>Materials</b>	<b>In this unit of work, pupils learn....</b> Broadening their experience of the properties of materials, children investigate hardness, transparency and conductivity and consider how these properties influence the uses of materials. They explore reversible changes, including dissolving and changes of state. Children compare these to irreversible changes, including rusting, burning and mixing vinegar and bicarbonate of soda.	<b>Progression of Knowledge</b> To know that some substances will dissolve in a liquid to form a solution. To know the 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 know that some liquids and solids can be separated using sieving, filtering and evaporation and to describe these processes. 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.)
<b>Unit:</b> Earth and space (6 lessons)		
Forces, Earth and space	<b>In this unit of work, pupils learn....</b> Exploring some of the key celestial bodies in our solar system, children learn the names and compare their movements. Pupils discover the relationship between the Earth's rotation and day and night, making models to represent their knowledge. They make their own sundials and consider how and why our ideas about the universe have changed so much over history.	<b>Progression of Knowledge</b> To know that the Sun is a star at the centre of our solar system. To know 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. To know that a moon is a celestial body that orbits a planet and give examples of moons that orbit other planets. 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 know that the Moon orbits around the Earth. To understand how the Earth's rotation causes day and night and the apparent movement of the Sun across the sky.

<b>Unit: Life cycles and reproduction (6 lessons)</b>		
Living things and their habitats	<b>In this unit of work, pupils learn....</b> Studying different animals' life cycles, children learn about the significance of reproduction for a species' survival. Pupils calculate the probability of male and female turtles hatching and grow plants to compare asexual and sexual reproduction. Pupils compare fertilisation across different animals and explore the needs of a fetus. Children narrate their own documentary in the style of an inspirational naturalist	<b>Progression of Knowledge</b> 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. To know that sexual reproduction requires two parents, whereas asexual reproduction only requires one parent. To know that there are different processes plants and animals use to reproduce (asexual and sexual reproduction).
<b>Unit: Circulation and exercise (6 lessons)</b>		
<b>Animals, Including Humans</b>	<b>In this unit of work, pupils learn....</b> Studying the human circulatory system, children learn about the role of the heart, blood and blood vessels and use models to demonstrate their function. They play the role of healthcare professionals to diagnose patients and play games to explore how lifestyle choices affect our health. Pupils devise their own investigation to look at the relationship between exercise and heart and breathing rates, applying their knowledge of variables.	<b>Progression of Knowledge</b> 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 gestation periods vary across mammals.
<b>Unit: (Making Connections)</b>		

## Science knowledge – Year 6

<b>Unit:</b> Classifying big and small (6 lessons)		
<b>Living Things and Their Habitats</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Children broaden their knowledge of how vertebrates, invertebrates, plants and micro-organisms are grouped using shared characteristics. They discover how Carl Linnaeus developed the Linnaean and binomial systems for classifying and naming living things.</p> <p>Pupils use and produce classification keys to sort and identify organisms.</p>	<p><b>Progression of Knowledge</b></p> <p>To know that ‘organism’ is a term used to refer to an individual living thing.</p> <p>To know that micro-organisms are incredibly small and cannot usually be seen by the naked eye.</p> <p>To know the characteristics of the different groups of vertebrates and commonly found invertebrates.</p>
<b>Unit:</b> Light and reflection (6 lessons)		
<b>Energy</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Using their prior knowledge of light, children study unusual luminous objects and investigate the properties of light transfer. They explore how our eyes allow us to see and how mirrors can be used in a variety of ways.</p> <p>Pupils investigate the laws of reflection and build their own periscope testing its effectiveness by completing a series of challenges.</p>	<p><b>Progression of Knowledge</b></p> <p>To know that light travels in waves but that it appears to travel in a straight line.</p> <p>To know that shiny surfaces reflect light uniformly whereas dull surfaces scatter the reflected light.</p> <p>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.</p> <p>To understand why shadows have the same shape as the objects that cast them.</p> <p>To understand relationships between light sources, objects and shadows.</p> <p>To know that when light is reflected off a surface, its direction changes.</p> <p>To know how a periscope works using reflection of light on plain surfaces.</p> <p>To know how light is reflected from a plain surface.</p> <p>To understand how the angle of a reflected ray is affected by the angle of the incoming ray, when reflected from a plain surface.</p>
<b>Unit:</b> Evolution and inheritance (6 lessons)		
<b>Living things and their habitats</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Studying patterns through families, children learn about features that are inherited from parents and those that are environmental. Through the eyes of Darwin and Wallace, pupils understand how observations lead to theories and explore the survival of the fittest. They model the variation and natural selection of Darwin’s finches and use this information to begin to explain how species evolve over time and how human input may affect the process.</p>	<p><b>Progression of Knowledge</b></p> <p>To know that living things have changed over time.</p> <p>To know that fossils provide us with information about living things that inhabited the Earth millions of years ago.</p> <p>To know that characteristics are passed from parents to their offspring, but that all offspring vary from their parents.</p> <p>To know that over time, variation in offspring can affect animals’ chances of survival in particular environments.</p>

		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.
<b>Unit:</b> Circuits, batteries and switches (6 lessons)		
<b>Energy</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Using their prior knowledge of electrical circuits, children learn to draw conventional circuit diagrams and use models to explain current and voltage.</p> <p>They make their own batteries, relate this to their knowledge of voltage and explore how battery research has impacted other scientific progress.</p> <p>Pupils investigate the use of switches and fuses and apply their electrical knowledge to design and produce their own electrical device.</p>	<p><b>Progression of Knowledge</b></p> <p>To know a wider variety of components in a series circuit (including buzzer and motor).</p> <p>To know the conventions used to draw circuit diagrams, including the recognised symbols for common components and using straight lines.</p> <p>To know that the voltage of a circuit can be changed and how this affects bulb brightness (or buzzer volume).</p>
<b>Unit:</b> Circulation and exercise (6 lessons)		
<b>Animals, Including Humans</b>	<p><b>In this unit of work, pupils learn....</b></p> <p>Studying the human circulatory system, children learn about the role of the heart, blood and blood vessels and use models to demonstrate their function. They play the role of healthcare professionals to diagnose patients and play games to explore how lifestyle choices affect our health. Pupils devise their own investigation to look at the relationship between exercise and heart and breathing rates, applying their knowledge of variables.</p>	<p><b>Progression of Knowledge</b></p> <p>To know the main parts of the human circulatory system (heart, blood vessels and blood).</p> <p>To know that the heart pumps blood around the body.</p> <p>To know that the blood vessels transport blood around the body.</p> <p>To know that the blood transports vital substances around the body, including oxygen and nutrients.</p> <p>To understand the relationships between different organ systems.</p> <p>To understand the impact of diet, exercise, drugs and lifestyle on the way a body functions.</p> <p>To know that the heart rate is the number of beats per minute and breathing rate is the number of breaths per minute.</p> <p>To know that exercise increases heart and breathing rates.</p>
<b>Unit: (Making Connections)</b>		

## Working Scientifically

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Posing questions</b>	Exploring the world around them and raising their own simple questions.  Recognising there are different types of enquiry (ways to answer a question).  Responding to suggestions of how to answer their questions.	Beginning to raise further questions during the enquiry process.  Considering what makes a testable question.  Beginning to recognise that there are different types of enquiry and that they are suitable for different questions.  Beginning to make suggestions about how different questions could be answered	Raising questions throughout the enquiry process.  Identifying testable questions.  Selecting the most appropriate enquiry method to answer questions and give justification.			
<b>Planning</b>	Beginning to recognise whether a test is fair.  With support, deciding if suggested observations are suitable.  Ordering a simple method.	Beginning to select from options which variables will be changed, measured and controlled.  Suggesting what observations to make and how long to make them for.  Planning a simple method, verbally and in writing. Beginning to write a simple method in numbered steps.  Selecting and beginning to decide what simple equipment might be used to aid observations and measurements.	Suggesting which variables will be changed, measured and controlled.  Making and explaining decisions about what observations to make and how long to make them for.  Writing a method including detail about how to ensure control variables are kept the same  Writing a method that considers reliability by planning repeated readings.  Suggesting the most appropriate equipment to make observations and measurements and justifying their choices.			
<b>Predicting</b>	Suggesting what might happen, often justifying with personal experience.	Making predictions about what they think will happen by: <ul style="list-style-type: none"> <li>Using scientific knowledge and/or personal experience to explain their prediction (because...)</li> <li>Beginning to consider cause and effect when making predictions, where appropriate.</li> </ul>	Making increasingly scientific predictions by: <ul style="list-style-type: none"> <li>Using previous scientific knowledge and evidence to inform their predictions.</li> <li>Using scientific language to describe a potential outcome or explain why they think something will happen.</li> <li>Making links between topics to evidence a prediction.</li> </ul>			

		<ul style="list-style-type: none"> <li>Predicting a trend by considering how the changing variable will affect the measured variable. (The smoother the surface, the longer the distance the car will travel)</li> </ul>	
<b>Observing (Qualitative data)</b>	Using their senses to describe, in simple terms, what they notice or what has changed.	Using their senses to describe, in more detail and with simple scientific vocabulary, what they notice or what has changed.	Using their senses to describe, in detail and with a broader range of scientific vocabulary, what they notice or what has changed.
<b>Measuring (quantitative data)</b>	<p>Using non-standard units to measure and compare. Beginning to use standard units to measure and compare.</p> <p>Beginning to use simple measuring equipment to make approximate measurements.</p> <p>Reading simple numbered scales.</p>	Using standard units to measure and compare. Using measuring equipment with increasing accuracy. Reading scales with unmarked intervals between numbers.	<p>Using standard units to measure and compare with increasing precision (decimals).</p> <p>Reading a wider variety of scales with unmarked intervals between numbers.</p>
<b>Researching</b>	Gathering specific information from one simplified, specified source.	Gathering specific information from a variety of sources.	Gathering answers to open-ended questions from a variety of sources.
<b>Recording (diagrams)</b>	Drawing and labelling simple diagrams.	<p>Beginning to draw more scientific diagrams by:</p> <ul style="list-style-type: none"> <li>Using some standard symbols.</li> <li>Drawing in 2D to produce simple line diagrams.</li> <li>Labelling with more scientific vocabulary.</li> </ul>	<p>Drawing scientific diagrams by:</p> <ul style="list-style-type: none"> <li>Using a wider range of standard symbols.</li> <li>Drawing with increasing accuracy.</li> <li>Labelling with a broader range of scientific vocabulary.</li> <li>Annotating diagrams to explain concepts and convey opinions.</li> </ul>
<b>Recording (tables)</b>	<p>Using a prepared table to record results including:</p> <ul style="list-style-type: none"> <li>Numbers.</li> <li>Simple observations.</li> <li>Tally frequency.</li> </ul>	<p>Using a prepared table to record results including more detailed observations.</p> <p>Using tables with more than two columns. Identifying and adding headings to tables. Beginning to design simple results tables.</p>	<p>Using tables with columns that allow for repeat readings.</p> <p>Suggesting headings to tables, including units.</p> <p>Designing results tables with increasing independence with consideration of variables where applicable.</p> <p>Calculating the mean average.</p>

<b>Grouping and classifying</b>	<p>Grouping based on visible characteristics.</p> <p>Organising questions to create a simple classification key.</p>	<p>Grouping based on visible characteristics and measurable properties.</p> <p>Populating a pre-prepared branching and number key. Choosing appropriate questions for classification keys.</p>	<p>Grouping in a broader range of contexts.</p> <p>Organising the layout of number and branching keys.</p> <p>Formulating appropriate questions for classification keys.</p>
<b>Graphing</b>	<p>Representing data using pictograms and block charts.</p>	<p>Representing data using bar charts.</p> <p>Drawing bars with greater accuracy.</p> <p>Reading the value of bars with greater accuracy.</p>	<p>Representing data by using line graphs and scatter graphs. Plotting points with greater accuracy.</p> <p>Reading the value of plotted points with greater accuracy.</p>
<b>Analysing and drawing conclusions.</b>	<p>Using their results to answer simple questions</p> <p>Beginning to recognise when results or observations do not match their predictions.</p>	<p>Writing a conclusion to summarise findings using simple scientific vocabulary.</p> <p>Beginning to suggest how one variable may have affected another.</p> <p>Beginning to quote results as evidence of relationships.</p> <p>Identifying data that does not fit a pattern (anomalous data).</p> <p>Recognising when results or observations do not match their predictions.</p> <p>Beginning to use identified patterns to predict new values or trends.</p>	<p>Writing a conclusion to summarise findings using increasingly complex scientific vocabulary.</p> <p>Suggesting with increasing independence how one variable may have affected another.</p> <p>Quoting relevant data as evidence of relationships.</p> <p>Identifying anomalies in repeat data and excluding results where appropriate.</p> <p>Comparing individual, class and/or model data to the prediction and recognising when they do not match.</p> <p>Using identified patterns to predict new values or trends.</p>
<b>Evaluating</b>	<p>Beginning to recognise whether a test is fair or not.</p>	<p>Beginning to identify steps in the method that need changing and suggest improvements.</p> <p>Beginning to identify which variables were difficult to control and suggesting how to better control them.</p> <p>Commenting on the degree of trust by reflecting on:</p> <ul style="list-style-type: none"> <li>Results that do not fit a pattern (anomalies).</li> </ul>	<p>Identifying steps in the method that need changing and suggesting improvements.</p> <p>Identifying which variables were difficult to control and suggesting how to better control them.</p> <p>Commenting on the degree of trust by also reflecting on:</p> <ul style="list-style-type: none"> <li>Accuracy (human error with equipment).</li> <li>Reliability (repeating results).</li> <li>Sources of information (e.g. websites, books).</li> </ul>

		<ul style="list-style-type: none"> <li>The quality of results (accurate measurements and maintaining control variables).</li> </ul> <p>Beginning to identify new questions that would further the enquiry.</p>	<p>Deciding what data to collect to further test direct</p> <p>Posing new questions in response to the data, that would extend the enquiry.</p>
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