Lightcliffe CofE Primary School

Science Curriculum Intent and Overview

In partnership to **Educate, Nurture & Empower**

A member of ABBEY MULTI ACADEMY TRUST

Science at Lightcliffe CE Primary School

At Lightcliffe Primary, we aim to create a culture of curiosity to inspire pupils to learn about the world they live in and gain a deep understanding of how Science has shaped our world today. We want our curriculum to inspire the children that we teach and equip them with the knowledge and skills to learn Science and learn about its uses and significance to society. This will highlight the significant contribution science has made in the past. For example, by eradicating smallpox and discovering penicillin. But pupils will also learn about the continuing importance of science in solving global challenges such as climate change, food availability, controlling disease and access to water.

Science education also provides the foundation for a range of diverse and valuable careers that are crucial for economic, environmental and social development (Ofsted, Research review series: science 29 April 2021).

At Lightcliffe Primary, we aim to deliver a high-quality science education that provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes (National curriculum in England: science programmes of study, May 2015).

Implementation

When is Science taught?

Pupils begin their formal science education in the early years foundation stage (EYFS). This involves learning foundational knowledge primarily through the 'understanding the world: the natural world' area of learning. This provides a number of rich contexts for pupils to learn a wide range of vocabulary. These words form the beginnings of scientific concepts that will be built on in Year 1 and beyond. Because pupils develop their scientific and non-scientific vocabulary during this time, the EYFS should not just be considered as preparation for learning further science in Year 1. (Ofsted, Research review series: science April 2021)

In KS 1 and 2. Science is taught every week across all year groups. Substantive knowledge alongside disciplinary knowledge is sequenced and taught in topics that progress across the age phases. We have selected the 'Developing Experts' platform to enrich and extend learning in Science so that our children are able to see possible careers in Science and learn from experts in society.

How is Science taught?

Activities are carefully chosen so that they match specific curriculum intent.

Teachers use systematic teaching approaches, where learning is scaffolded using carefully sequenced explanations, models, analogies and other representations to help pupils to acquire, organise and remember scientific knowledge.

Teaching takes account of the limited working-memory capacity of their pupils when planning lessons. Systematic approaches, alongside carefully selected texts, are used to teach the most important vocabulary in science.

Learning takes place both inside and outside the classroom.

How do we assess and monitor Science?

Class teachers are responsible for the assessment of children in their class in Science. In EYFS evidence in Floor books and Tapestry is used to make judgements about progress and attainment. In KS 1 and 2 evidence from pupil's science is used to assess and monitor children's progress and attainment. At the end of every taught unit, teachers make summative judgements on the science tracking grid.

The Science lead is responsible for ensuring progression in knowledge and skills across year groups and monitoring the quality of the subject through lesson drop ins, book looks, analysis of assessment data, staff development sessions and pupil interviews.

Greater Depth:

In order to cater for the children who are working at greater depth we will encourage them and provide opportunities for them to further deepen their substantive and disciplinary knowledge. This will include:

- In class questioning and extending. Which will require children to evidence or justify their understanding. This could be through oral explanation or through diagrams/ drawings or written.
- considering learning roles. Pupils may be encouraged to peer teach a skill or concept. Lead or design a practical group activity to support scientific study. Take on a leadership role within a group. Showcase/ share their learning with others by researching a particular area of interest to present to the class by being provided with suitable materials and encouraged to increase their knowledge and skills to become an expert in their field, through further reading suggested by the teacher, independent research and presenting findings in an analytical and evaluative way.
- leadership opportunities such as becoming a Science Ambassador during Science week. Representing their class to discuss science with the subject lead and to work collaboratively with the junior leadership team, class council and SLT.
- access to national competitions and resources through STEM and CREST awards. Parents and children will be signposted to opportunities for extension beyond the classroom through national opportunities through the STEM network and by completing CREST awards.

Key Curriculum Principles

1. The Bigger Picture: Progression of knowledge should be clear

The knowledge (both disciplinary and substantive) that children will learn through each year is clear and builds on prior learning. Units of work are clearly sequenced and the substantive knowledge will be explicitly taught supported by a variety of resources (Science lead, equipment, online platforms).

2. Enrichment:

Pupils will experience a rich science curriculum that aims to inspire curiosity and develop the skills to enrich practical study of the subject. This enrichment will be enabled by trips, visits, the outside classroom, visitors, equipment and online resources.

3. Disciplinary knowledge

Specific scientific skills are explicitly taught throughout and alongside substantive knowledge to enable a progression of skills, concepts and scientific enquiry. There is coherence between maths and science so that the subjects support the development of each other. The content areas for this study are set out in the 'working scientifically' programme of study which include: knowledge of methods (fair testing, models, classification, pattern spotting, description), Knowledge of apparatus and techniques including measurement, knowledge of data analysis including ways of presenting findings to others and knowledge of how science uses evidence to support and develop explanations and theories.

4. Oracy:

Through our work with Voice 21 and participation in the 'Narrowing the Word Gap' project, pupils regularly experience different types of talk, such as exploratory talk and presentational talk. Teacher's discuss scientific vocabulary and present it to them. This might be through listening to storybooks and non-fiction texts, as well as rhymes and poems. Teachers model effective use of scientific language and encourage children to use specific scientific vocabulary in their work, providing them with word banks.

Overview, Long Term Plan, Content and progression

Class/ Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Reception						

Statutory framework for EYFS (2021) Understanding the World

Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range of children's personal experiences increases their knowledge and sense of the world around them –from visiting parks, libraries and museums to meeting important members of society such as police officers, nurses and firefighters. In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children's vocabulary will support later reading comprehension.

ELG: The World

Children at the expected level of development will:

- Explore the natural world around them, making observations and drawing pictures of animals and plants;
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class;
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter

Science Long Term Plan

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	Everyday Materials (Seasonal changes)		Animals including Humans		Plants	
Year 2	Animals including Humans	Living things and their habitats	Use of Everyday Materials		Habitats and Life Cycles	
Year 3	Light and Shadows	Forces and Magnets	Rocks and Soils	Plant Life Cycles	Humans and other animals	
Year 4	Grouping and Classifying Living Things	Circuits and Conductors	Animals including humans: teeth and digestion	Sound	Solids and Liquids	States of Matter
Year 5	Properties and Changes of Materials	Earth and Space	Forces	Living things and Habitats	Animals inc. Humans (Life Cycles)	
Year 6	Living Things and their Habitats	Evolution and Inheritence	Light	Animals inc. Humans (Circulatory Systems and Health)		Electricity

Key Stage 1

During years 1 and 2, pupils should be taught to use the following practical scientific

methods, processes and skills through the teaching of the programme of study content:

- 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.

Curriculum content Statutory requirements for Year 1	**Year 2 Curriculum content. Statutory requirements.**
Plants Pupils should be taught to: • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees.	Living things and their habitats Pupils should be taught to: • explore and compare the differences between things that are living, dead, and things that have never been alive • identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • identify and name a variety of plants and animals in their habitats, including microhabitats • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.
Animals, including humans Pupils should be taught to: • identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • identify and name a variety of common animals that are carnivores, herbivores and Omnivores • describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) • identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	Plants Pupils should be taught to: • observe and describe how seeds and bulbs grow into mature plants • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

Everyday materials Pupils should be taught to: • distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday materials • compare and group together a variety of everyday materials on the basis of their simple physical properties.	Animals, including humans Pupils should be taught to: • notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.
Seasonal changes Pupils should be taught to: • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies	Uses of everyday materials Pupils should be taught to: • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Lower Key Stage 2

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- 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 straightforward scientific evidence to answer questions or to support their findings

Year 3 Curriculum content Statutory requirements	Year 4 Curriculum content Statutory requirements
Plants Pupils should be taught to: • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	Living things and their habitats Pupils should be taught to: • recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things.
Animals, including humans Pupils should be taught to: • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement.	Animals, including humans Pupils should be taught to: • describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey.
Rocks Pupils should be taught to: • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter.	States of matter Pupils should be taught to: • compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. •
Light Pupils should be taught to: • recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes	Sound Pupils should be taught to: • identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it

• recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change. •	• recognise that sounds get fainter as the distance from the sound source increases.
Forces and magnets Pupils should be taught to: • compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing.	Electricity Pupils should be taught to: • identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors.

Upper Key Stage 2

Years 5 and 6 Statutory requirements During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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.

Year 5 Curriculum content Statutory requirements	Year 6 Curriculum content Statutory requirements
Living things and their habitats Pupils should be taught to: • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals.	Living things and their habitats Pupils should be taught to: • describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals • give reasons for classifying plants and animals based on specific characteristics.
Animals, including humans Pupils should be taught to: • describe the changes as humans develop to old age.	Animals, including humans Pupils should be taught to: • identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • describe the ways in which nutrients and water are transported within animals, including humans..
Properties and changes of materials Pupils should be taught to: • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind • of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	Evolution and inheritance Pupils should be taught to: • recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
Earth and space Pupils should be taught to: • describe the movement of the Earth, and other planets, relative to the Sun in the solar system • describe the movement of the Moon relative to the Earth • describe the Sun, Earth and Moon as approximately spherical bodies	Light Pupils should be taught to: • recognise that light appears to travel in straight lines • use the idea that light travels in straight lines to explain that objects are seen • because they give out or reflect light into the eye

• use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky	• explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
Forces Pupils should be taught to: • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	Electricity Pupils should be taught to: • associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • compare and give reasons for variations in how components function, including the • brightness of bulbs, the loudness of buzzers and the on/off position of switches • use recognised symbols when representing a simple circuit in a diagram.

	Substantive Knowledge	Disciplinary Knowledge	Vocabulary
Reception: All About Me	To know that we see with our eyes, smell with our nose, hear with our ears, taste with our tongues and touch with our skin. To know that the five senses are sight, smell, hearing, taste and touch. To know that different objects make different sounds when they are hit or strummed. Deeper learning: To know that our senses can help us identify dangers.	To group foods based on their taste and smell. To compare different sounds. To ask questions to explore different answers.	senses eyes sight taste touch trumpet reed ripple noise vibration sound hearing

	Substantive Knowledge	Disciplinary Knowledge	Vocabulary
Reception: Seasonal Changes (Why are there so many leaves on the Ground?)	children observe and discuss seasonal changes in winter, such as cold, freezing temperatures and that some trees have no leaves. Children will discuss how winter clothing is important to keep us warm. Within this, children can be introduced to other climates, such as polar climates, where temperatures are typically low. Children will explore the features of animals in these climates and how these help animals to survive, such as polar bears having thick fur. Deeper learning; Animals that live in different habitats have ways to adapt to that environment.	To compare different habitats such as woodland and polar regions To describe adaptations and differences between animals found such as hedgehogs which hibernate and polar bears which have thick fur. To observe seasonal changes and use description such as 'trees lose leaves' or 'leaves change colour'. To describe the seasons and some of the features of their weather patterns.	winter cold warm freeze frozen melt ice rainy sunny frosty snowy water leaves tree change hibernate hedgehog polar polar bear penguin fur

	Substantive Knowledge	Disciplinary Knowledge	Vocabulary
Reception: How Do Things Move? How do we get about? (Machines)	To know that cars, buses, bikes, ships and aeroplanes are examples of transport that help us to travel. To know that machines help make tasks easier. To know that everything can be classified as living or non-living. Deeper learning: To know that non-living things cannot grow, respire, reproduce or interact with their environment.	To group vehicles based on how they enable us to travel e.g. air, sea, road. To identify and group different types of machine. To gather data to answer questions.	bus transport bicycle aeroplane wheelbarrow wheel whisk hammer non-living car toy scooter

	Substantive Knowledge	Disciplinary Knowledge	Vocabulary
Reception: What happened to Jack's Beans (Plants and Seeds)	To know a habitat is where an animal or plant lives. To know that insects have six legs and usually a pair of wings. To know an insect has a life cycle made up of different stages Deeper learning: To know that insects start their life as an egg, then develop into larvae and then into an adult.	Use simple equipment to measure Group and classify insects Use simple features to describe, sort and compare objects, materials and living things.	Ladybird Ant butterfly spider snail honey worm fly beetle insect ant mouth sap habitat food greenfly life cycle

	Substantive Knowledge	Disciplinary Knowledge	Vocabulary
Reception: Animals (What would you find on the farm?)	Children explore and sort animals based on their simple features. Non-fiction books are a useful resource to introduce these features to children in meaningful contexts. Children will be introduced to vocabulary which will support them to name key features and group animals. For example, birds have two legs, wings and feathers. Children will name common farm animals and contrast with the locations oof wild animals from different habitats such as desert, ocean, polar regions and jungle. Deeper learning That animals and plants adapt to their environment, and that adult animals may look different form their young.	Describe the life cycles of some common animals – cows, sheep, pigs, horses. Sort and match animals and young – these may look like their parent animal, or may be different such as chickens which lay an egg, and tadpoles which grow into frogs. Match the animal to its parent based on observable features.	animal scales feathers fur feet legs tail wings head beak snake bird pigeon magpie sort mouse frog toad cat dog fox

	Substantive Knowledge	Disciplinary Knowledge	Vocabulary
Reception: Keeping Healthy – who can I ask for help?	Children will understand that humans need food and water, shelter and care in order to stay healthy. Children will be able to sort food into food groups such as creating a healthy snack with fruit and vegetables. Children will recognise that they need sleep, exercise and food and that their body will indicate when it is well/unwell. Deeper learning Children will recognise and describe how they can care for themselves and when and to whom they might seek help such as when they are ill or injured.	Measuring height, weight, using standard and non standard measures. Identifying and sort food types and creating simple snacks. Describe how washing, bathing brushing hair, sleep, exercise and eating healthy food contribute to a healthy person. Describe how they can be cared for when they are ill or injured.	Fruit Vegetables Water Juice Teeth and toothbrush, paste Dentist, nurse, paramedic, doctor, pharmacist Clothing Sun lotion, hat, gloves, scarf, wellies

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 1: Everyday materials	To know that objects are made from materials To know the names of a variety of everyday materials, including wood, plastic, glass, metal, water, and rock To know the difference between natural and manmade objects To know that some objects float and sink To know that some objects soak up water (are absorbent) Deeper learning: To know that materials are chosen to make everyday objects because of their properties	Use everyday language/begin to use simple scientific words to ask or answer a scientific question. Complete a simple test to identify the properties of materials. Predict whether items will sink or float. Complete a simple test to identify if objects sink or float. Complete a simple test to identify is materials are absorbent or waterproof.	Begin to record simple data Use simple, nonstandard equipment and measurements in a practical task.	To identify and describe a variety of everyday materials To identify what material an object is made from Sort and group objects and materials based on their simple physical properties.	Explain what they have found out about floating and sinking comparing results to prediction. Explain, with help, what they have found out about the absorbency of materials. Use every day or simple scientific language to ask and/or answer a question on given data.	material wood metal fabric plastic object brick glass elastic property opaque stiff dull transparent rubber polyester factory manmade natural submerge float predict buoyant sink waterproof sponge absorbent soak

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 1: Plants	To know thatseeds grow intoplants the four seasons To know the parts of a plant and treeeach season brings and how these changes affect Some plants and animals plants can grow in the Tomakeown the weather associated with each season To know the difference between deciduous and Toknow thatseasons evergreen trees exist because the amount To know that plants are a of sunlight we get source of food changes throughout the year Deeper learning: To know that every seed how humans has the beginnings of a dress during the summer new plant inside it, along and winter seasons to with a store of food to cope with the weather help it grow. conditions. Deeper learning: To know that some animals hibernate in the winter	To ask questions and predict about what might happen. changes that occur with each Explain how to season. plant a seed and Use the language predict what might associated with happen to it. seasonal changes To ask and answer Predict which seed questions with which fruit/vegetable. which week was the rainiest by looking at the rainwater collected.	To observe how seeds Observe weather closely using a change over a magnifying glass period and record Weekly To observe familiar plants and measurements in a compare and simple table. contrast their To record rainfall features. in a simple bar Record ideas and graph or by drawing pictorial representations. explanations. Make comparisons between a deciduous tree and an evergreen tree Record findings in a table Observe the growth of plants and keep a record of how they change over time.	Identify a plant Sort and and describe its compare features. the features of the seasons and Group plants Explain reasons according to for matching images with one of their features e.g. particular colour. seasons.	Use everyday Use analysed data to simple scientific answer a language to ask question. and/or answer a question on given data.	predict season plant summer tree spring seed autumn oak winter flower weather root harvest leaf autumn petal hibernate stem protect seed sweet daisy temperature dandelion frost child wild grow buttercup evergreen spring change deciduous compare season bush summer heatwave branch vegetable warm farm sun protection tractor record supermarket rainfall fruit results grape observe seed adult plant seedling young plant growth

	Substantive Knowledge	Disciplinary Knowledge				Vocabulary
		Questioning, predicting and planning	Observing and recording evidence	Identifying and Classifying	Analysing and evaluating	
Year 1: Animals including Humans	To know the five groups of animals: birds, mammals, reptiles, fish and amphibians. To know that birds are characterised by their beaks, feathers and wings. To know that mammals are warm-blooded vertebrates (vertebrates have backbones) with hair. They feed their young with milk and have a more well-developed brain than other types of animals. To know that reptiles are known for their scaly skin and ability to regulate their body temperature To know that amphibians are known for their ability to live both on land and in water, and often have slimy skin. To know that fish are characterised by their gills, fins, and scales, and are found in a wide range of aquatic environments To know animals that are herbivores, carnivores and omnivores. Deeper learning: To know the difference between wild and domesticated animals.	To ask and answer questions about the characteristics of animals. To use simple scientific language to answer questions about animals. .	To recording outcomes of sorting activity using a Venn diagram. To observe living things and describe what they see.	To sort images of animals according to the group they belong to. To group mammals and birds based on what they have in common. To classify animals based on their similarities and differences.		amphibian reptile bird fish mammal hatchling feather backbone characteristic warm-blooded reptile scale amphibian gill cold-blooded carnivore omnivore predator canine herbivore natural wild shelter pet veterinary climate similarities differences unsuitable compare

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 2: Animals including Humans	-To know that animals have different ways of keeping warm (i.e. reptiles need direct heat to survive). -To know that animals need some or all of air, water, food and shelter to survive. -To know that animals are carnivores, herbivores or omnivores. -To know that fish can breathe under water using gills. -To know that amphibians can live on land and in water.	- Ask simple questions about what animals need to survive. - Make predictions about what might happen if an animal's habitat or diet changes. - Suggest ways to find out about animals' features or behaviours.	- Observe animals (live or videos/photos) and describe what they see. - Use simple tables or charts to record information about animal groups, diets, or habitats.	-Group animals by features such as body covering, diet, or how they breathe. - Identify animals as mammals, birds, reptiles, amphibians, or fish.	- Talk about what they found out from their observations or tests. - Compare results to their predictions or known facts.	Mammals Birds Fish Amphibians Reptiles Humans Survival Habitat Diet Herbivore Carnivore Omnivore Gills Warm-blooded Cold-blooded

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 2: Everyday Materials	To know that a material is what something is made of. To know that materials can be changed by squashing, bending, twisting and stretching. To know that some materials are stronger than others. To know that some materials are suitable / unsuitable for particular purposes. To know that some materials can be melted to change their shape. Deeper learning: To know real-life examples of when bending, twisting, stretching or squashing objects has been useful.	Use everyday language/begin to use simple scientific words to ask or answer a scientific question about materials. Perform simple tests on a range of different materials and their uses to check their suitability for bridge construction. Plan and carry out a simple test to explore the stretchiness of materials. Predict what will happen to materials when twisted, bent, stretched or squashed. Follow simple instructions to test how waterproof materials are.	Observe what happens to materials when they are tested and record evidence in a chart. Measure how much water is in a beaker. Record results in a bar graph.	-Group everyday objects based on the material they are made from (e.g. wood, plastic, metal, glass, fabric, rock). -Identify and name a variety of materials used for the same object (e.g. spoons made of plastic, metal, wood). -Classify materials by their properties (e.g. hard/soft, stretchy/stiff, waterproof/not waterproof). -Sort materials according to their uses (e.g. materials used for building, clothing, containers). -Match materials to their purposes based on properties (e.g. waterproof materials for raincoats).	Analyse outcomes of simple test to evaluate which materials are the most successful to use as a bridge. Analyse outcomes of simple test to evaluate which materials are the most stretchable. Analyse outcomes of simple test to explain what happens when materials are changed.	brick material suitable property object bridge structure obstacle triangle construction elastic hinder floppy stretchy limit bend twist stretch force squash waterproof protective fluorescent safety mackintosh

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 2: Living Things in their Habitats	To know that there are things that are living, dead or have never been alive. To know there are seven characteristics of living things: movement, respiration, growth, excretion, nutrition, reproduction, senses. To know that a microhabitat is a smaller area that can be found within a habitat. To know that producers make their own food, which creates energy for them to grow, reproduce and survive. To know that consumers have to eat to get energy. To know that a food chain describes who eats who. Deeper learning: To know what would happen if one element of the food chain was in short supply.	-Ask questions about what animals and plants live in different habitats. -Predict which living things might be found in a particular habitat (e.g., pond, woodland, garden). -Predict how changes to a habitat might affect the animals and plants living there. -Suggest questions about how animals and plants meet their basic needs in their habitats.	-Observe and record the types of plants and animals found in different habitats using simple charts or tally marks. -Use drawings or photos to record features of living things and their habitats. -Record changes in a habitat over time (e.g., seasonal changes). -Use simple tables to record the number and types of animals found in a habitat.	-Identify common animals and plants in a range of habitats. -Classify animals based on where they live (e.g., water, land). -Group plants and animals by features such as size, colour, or type (e.g., trees vs. flowers). -Use simple classification keys or charts to sort living things found in the environment.	-Compare the suitability of different habitats for different animals and plants. -Discuss why certain animals or plants are found in particular habitats (e.g. frogs in ponds, camels in deserts). -Reflect on how animals are suited to their habitats and how this helps them survive. -Use evidence from investigations or observations (e.g. minibeast hunts) to explain patterns or outcomes.	excrete nutrition reproduce respire senses fungi microhabitat habitat survive shelter colony condition insect antennae suitable omnivore herbivore producer consumer carnivore nutrient caterpillar life cycle food chain rot

	Substantive Knowledge	**Disciplinary Knowledge**				**Vocabulary**
		Questioning, predicting and planning	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	
Year 2: Life Cycles	-To know that Most mammals give birth to their young. -To know that reptiles amphibians birds and most insects lay eggs and these are their offspring. -To know that humans give birth to their young. -To know that animals follow different stages of the life cycle. -To know that the body changes and grows throughout the life cycle.	- Ask questions such as "Do all animals grow in the same way?" or "What happens after an egg hatches?" - Predict how animals might change as they grow. - Suggest ways to find out about different life cycles.	Observe changes in animals over time (e.g. frogspawn to tadpole). - Use drawings, photographs, or diagrams to record stages of growth. - Use timelines or sequencing activities to show life stages.	- Group animals based on how they reproduce (e.g. laying eggs vs live birth). - Classify life stages of different animals. - Match animals to their offspring.	- Talk about how life cycles are similar or different between species. - Use observations to explain how animals grow and change. - Reflect on their findings and compare to what they predicted.	Offspring Growth Egg Adult Parent Baby Child Teenager Life Cycle

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 3: Forces and Magnets	To know that forces are the things that allow the movement of all objects around us. To know that friction is a force between two surfaces that are sliding, or trying to slide, across each other. To know that magnets have two poles: north and south. To know that 2 magnets will attract or repel each other; opposite poles attract and similar poles repel. To know that magnetic materials are always made of metal. To know that magnetism is a force that can act at a distance. Deeper learning: To know some everyday uses of magnets	-Predict how different surfaces will affect the movement of objects. -To predict if magnets will attract or repel one another. -To predict which materials will be magnetic. -To carry out a test to determine which materials are magnetic. -To predict which magnets will be the strongest and weakest. -To carry out a fair test to determine the strength of different magnets.	-Record measurements and observations in a table. -Transfer measurements to a bar graph. -Record results in a Carroll diagram. -Decide what to observe and measure during investigation. -Take accurate measurements.	-Identify objects that are attracted to magnets (magnetic materials) and those that are not (non-magnetic materials). -Classify materials based on whether they are magnetic or non-magnetic. -Sort different types of magnets (e.g., bar magnets, horseshoe magnets) by shape or size. -Group objects based on how strongly they are attracted to a magnet (strong, weak, no attraction). -Classify everyday forces (push, pull) by observing their effects on objects.	Use findings to explain which forces were involved. Analyse data to draw conclusions about the impact of friction on the movement of objects. To analyse outcomes to conclude which materials are magnetic. Gather data to answer which magnets are the strongest / weakest.	friction air resistance non-contact forces force contact force motion texture resistance tilt surface repel magnet horseshoe magnet attract bar magnet iron magnetic field steel magnetism magnetic non-magnetic materials attract recycle non-contact forces magnetic north magnetic needle compass direction orienteering

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 3: Light and Shadows	To know that we need light in order to see things and that dark is the absence of light To know that exposure to the sun can be dangerous to humans To know that objects are reflective and some objects reflect light better than others. To know that a shadow is formed when an opaque object blocks the light To know that shadows change throughout the day due to the changing position of the sun. Shadows are longer in the early morning and late evening and are shortest in the middle of the day (noon). To know that shadows change when an object is moved closer or further away from the light source. Deeper learning: To know how shadows would differ in each season.	To answer questions about light using scientific vocabulary. To predict what will happen if an item is left in the sun without protection. To carry out a test to investigate the impact of sunscreen To plan a test to explore the reflectiveness of different materials. To predict what will happen to the size of a shadow throughout the day. To carry out a fair test to investigate what happens to a shadow when the light source is moved closer / further away.	To choose a way to record and present findings and conclusions of their investigation. Make systematic and careful observations. To observe how shadows change the further away from the light source they are and write an explanation of what they noticed. To record results in a table and then present in a graph.	-Identify sources of light (natural and artificial) and classify them accordingly. -Classify objects as transparent, translucent, or opaque based on how they let light through. -Identify and group different types of shadows based on their size and shape. -Classify how the position of a light source affects the length and direction of a shadow.	-To analyse results to draw a conclusion about what is important about sunscreen -To analyse results to draw a conclusion as to which materials are better at reflecting light. -To analyse results to draw a conclusion that explains what happens to your shadow throughout the day and explain why.	natural artificial source light reflect ultraviolet rays sunburn vitamin D protection exposure high visibility reflective surface materials fluorescent sundial ray block shadow opaque opposite position direction cast size puppet shape closer further

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 3: Rocks and Soils	To know that intrusive igneous rocks form beneath the earth's surface and extrusive igneous rocks are formed when hot molten rock solidifies on the earth's surface. To know there are three types of rock: igneous, sedimentary and metamorphic rocks To know that water causes rocks to erode To know that fossils are formed when things that have lived are trapped between rocks. To know that soil is made from rock and matter that has come from a recently living organism. Deeper learning: To know what causes hemical weathering, physical weathering and biological weathering.	To carry out a fair test to investigate the durability, permeability and density of a range of rocks. To use ideas about the properties of rocks to consider their uses in everyday life. To predict which rocks will be permeable. To plan and carry out a fair test to determine the permeability of rocks. To carry out a test to determine the properties of soils	-Observe and record the texture, color, and hardness of different rocks. -Record whether rocks absorb water or not during simple tests. -Use simple tables or charts to record types of soil collected from different locations. -Draw and label diagrams of rock and soil samples.	-Identify different types of rocks (igneous, sedimentary, metamorphic) based on appearance and texture. -Classify rocks by properties such as hardness, color, and permeability. -Identify and classify types of soil by texture and composition (sand, clay, loam). -Sort rocks and soils based on whether they contain fossils or not.	-To analyse results to sort rocks into groups based on their properties. -To analyse observations and measurements to determine which rocks are the most permeable. -To analyse observations to explain differences between soil samples.	extrusive igneous rock igneous rocks intrusive igneous rock magma crystals sandstone marble metamorphic rock limestone sedimentary rock texture erosion receding appearance submerged sediment amber embedded fossil extinct fragments decompose clay soil sandy soil chalky soil

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 3: Animals including Humans	To know how food from each food group is essential for human growth and health. To know that food labels show the nutrients in food. To know that animals have different types of skeleton: exoskeleton, endoskeleton and hydrostatic skeleton. To know the three main functions of the human endoskeleton are to protect, support and allow movement. To know that muscles allow animals to move. Deeper knowledge: To know what key bones in the human skeleton protect.	-Ask relevant scientific questions about animals' needs, growth, and health. -Make predictions about how changes in environment or diet might affect an animal's growth or behaviour. -Plan simple investigations to explore animal habits, such as observing feeding or movement. -Decide what equipment and observations are needed to collect data accurately during investigations.	-Observe and record the different types of animals, noting features such as size, shape, and movement. -Record changes in growth or development in humans or animals over time (e.g., height, teeth changes). -Use charts or tables to record dietary habits or food preferences of different animals. -Draw and label parts of the human body or animal skeletons from observations.	-To group foods according to the food group they belong to. -To match animals to their endoskeleton. -To identify the different bones in the human body and explain function.	-Analyse data from observations of growth to identify patterns or changes over time (e.g., how children's teeth change with age). -Evaluate how different diets affect the health and development of animals or humans. -Compare similarities and differences between animal species and evaluate how their features help them survive. -Assess the reliability of observations and suggest improvements for future investigations.	carbohydrate vitamin mineral nutrition protein energy nutrition label portion diet balanced vertebrate hydrostatic skeleton exoskeleton endoskeleton invertebrate ulna tibia fibular radius humerus spine rib cage vertebrate skull muscle diaphragm biceps contract hamstrings

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 4: Grouping and Classifying Living Things	To know that living things can be grouped in a variety of ways. To know that classification keys help group, identify and name a variety of living things in their local environment. To know that animals adapt to suit their environment.	-Formulate scientific questions about similarities and differences between living things. -Predict how living things might be grouped based on observable characteristics (e.g., habitat, diet, physical traits). -Plan investigations to explore and test criteria for grouping animals, plants, or microorganisms. -Identify and select appropriate tools and methods for observing, recording, and sorting living things during investigations.	-Make detailed observations of physical features of plants and animals to record distinguishing characteristics. -Use simple classification keys or charts to record identification of living things in different habitats. -Record findings using tables, tally charts, or labelled drawings to show differences and similarities. -Observe changes in living things over time and document any variations within groups.	-Identify and classify animals based on their habitats. -To identify similarities between animals that live in the same habitat. -To group animals according to a classification of their choice. -To identify how animals have been sorted and grouped.	- Analyse similarities and differences between living things to determine appropriate classification groups. -Evaluate the effectiveness of different classification keys or methods in identifying species. -Assess how environmental factors influence the characteristics used for grouping living things. -Critically compare groups of living things and suggest improvements to classification criteria based on observations.	habitat adapted conditions camouflage microhabitat species invertebrate classify vertebrate characteristics classification key organism identify criteria sub-group region blubber adapted colouring features non-flowering plant flowering plant pond dipping oxygenised ecosystem

	Substantive Knowledge	Disciplinary Knowledge				Vocabulary
		Questioning, predicting and planning	Observing and recording evidence	Identifying and Classifying	Analysing and evaluating	
Year 4: Animals inc. Humans (teeth and digestion)	To know the simple functions of the basic parts of the digestive system in humans. To know that teeth are classified into three groups: incisors, canines and molars. To know that incisors bite and cut food, canines tear food and molars grind and crush food. To know that predators are animals that hunt, kill and eat other animals for food. To know that prey is an animal hunted by another for food. Deeper learning: To know how to look after your teeth.	Predict the effect of different liquids on the enamel of teeth. Make decisions about an enquiry into the effect of different liquids on teeth, recognising when a fair test is necessary and beginning to identify variables.	Record findings about parts of the digestive system, using simple scientific language, written notes and labelled diagrams. Record findings about human teeth using simple scientific language, written notes and labelled diagrams. Make systematic and careful observations to explain the functions of organs within the digestive system. Make systematic and careful observations of the impact of liquids on teeth and record findings in a table.	-Identify different types of teeth (incisors, canines, molars) and classify them based on their shape and function. -Classify foods according to how they are broken down by different teeth during chewing. -Identify the main parts of the digestive system and classify them by their role in digestion (e.g., chewing, breaking down, absorbing). -Sort animals based on their teeth types and diets (herbivore, carnivore, omnivore).	Identify, with help, changes to the surfaces of teeth to help form conclusions about the impact of different liquids on the enamel.	small intestine digestive system stomach large intestine oesophagus liver peristalsis gall bladder absorb saliva jaw gum molars canines incisors plaque enamel tooth decay cavity fluoride producer consumer predator ecosystem prey tundra threatened interdependence hide food web

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 4: Circuits and Conductors	To know the components of a simple circuit: bulb, switch, battery, switch, buzzer and bell. To know what an electrical appliance is and why they can be dangerous. To know that a component in a circuit will only work if it is part of a complete loop with a battery. To know that conductors are materials that allow electricity to flow through them and that insulators do not. To know that a switch opens and closes a circuit and that components in the circuit will only work when the switch is closed. Deeper learning: To know some examples of when switches are used in everyday life.	Predict whether a circuit will operate a component or not explaining reasoning. Predict which materials will be insulators and conductors. Plan and carry out a fair test to determine which materials are conductors and insulators. Predict whether a switch will enable a bulb to light when placed in different positions in a circuit. Predict what will happen when additional components are added to a circuit. Plan and carry out a fair test to answer questions about the addition of components to a circuit.	Record and present information, findings and conclusions in writing and drawings. Record results of investigation in a table and transfer to a venn diagram. Make observations of circuits containing switches and record the outcome.	To classify appliances based on whether they are electrical or non-electrical.	Use scientific evidence to answer questions about electrical circuits. Use scientific evidence to answer questions materials that conduct or insulate electricity. Use recorded data to make predictions, pose new questions and suggest improvements for further enquiries.	electricity mains electricity appliance socket batteries series circuit voltage cell circuit component power current bulb wire battery conductor insulator metal copper rubber control current complete circuit incomplete circuit switch non-renewable energy wind turbines solar panels hydropower renewable energy

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 4: States of Matter	To know that there are three states of matter: solid, liquid and gas. To know that some materials change state when they are heated or cooled. To know that a solid changes to a liquid when it is heated and this is known as melting. To know that a liquid changes to a solid when it is cooled and this is known as freezing. To know that heating a liquid will change its state to a gas and this is known as evaporation. To know that a gas changes to a liquid when cooled and this is known as condensation. To know that the water cycle is a natural process that involves evaporation and condensation. Deeper learning: To know what transpiration, groundwater and run-off are in relation to the water cycle.	Predict which foods will have the highest melting point and explain reasoning using scientific vocabulary. Answer questions about changes of state using straight forward scientific evidence. Predict which container of liquid will evaporate more quickly and explain why. Conduct a fair test to investigate which liquid will evaporate more quickly.	Record and present information, findings and conclusions in writing and drawings. Take measurements of temperature using a thermometer. To present data in a bar graph. Record findings about the water cycle using simple scientific language, drawings and diagrams.	Classify substances based on their state of matter. Identify similarities and differences between properties of each state of matter.	Use scientific evidence to conclude which foods have higher melting points. Use scientific data to answer questions about the different boiling points of various substances. Use recorded data about the evaporation of liquid to make predictions, pose new questions and suggest improvements for further enquiries.	gas matter liquid volume solid particle arranged bond heated cooled reverse sublimation deposition freezing boiling condensation water vapour process absorb evaporation water cycle precipitation transpiration surface run off groundwater

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 4: Sound	To know that sound is created by vibrations. To know that sound travels from an object, through a medium, to the ear To know that some materials absorb sound and some materials reflect sound. Materials that absorb sound are called insulators. To know that the loudness of a sound is volume. The stronger the vibration, the louder the sound. To know that pitch is how high or low a sound it. Pitch is caused by the speed of a sound's vibrations. To know that sounds get fainter as the distance from the sound source increases. Deeper learning: To know that loud sounds can be dangerous and how we can protect ourselves from them	To answer questions about sound using scientific language. To plan a fair test to test which material makes the best ear defenders. To predict which material will be the best sound insulator. To plan a test to investigate the volume of sounds. To plan and make an instrument that creates sounds with different pitches.	To make careful and systematic observations and record results on a table. To take measurements using a decibel meter.	-Identify different sources of sound and classify them as natural (e.g. thunder, animal noises) or man-made (e.g. musical instruments, machines). -Classify objects based on how they produce sound (e.g. vibrating strings, air columns, surfaces). -Identify materials that sound can travel through and classify them as good or poor conductors of sound. -Group instruments or objects based on pitch or volume (e.g. high/low pitch, loud/soft sounds).	Identify, with help, similarities and differences in data to help form conclusions about how sound travels in solids, liquids and gases. To analyse data to conclude which material is the best sound insulator. To identify patterns in data to draw conclusions about the volume of sounds. To use scientific evidence to support findings.	eardrum signals vibration medium waves source vacuum particles echo energy reflect materials absorb defenders insulate volume power decibel meter decibels amplitude low pitch pitch orchestra instruments high pitch fade travel sound source particles energy

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 5: Properties and changes of materials	To know that a thermal conductors allow heat to pass through them easily. To know that thermal insulators prevent heat from passing through them easily. To know that hardness is the ability of a material to resist being dented. To know that some materials will dissolve in liquid to form a solution. To know that mixtures might be separated by sieving, filtering and evaporating. Deeper learning: To know that some changes are irreversible.	Make predictions and give a reason using scientific vocabulary Plan an investigation that tests whether materials are electrical conductors, transparent, strong thermal conductors or magnetic. Plan a fair test to determine which material is the best to insulate a cup. Plan a fair test to determine which materials are the hardest. Plan a fair test to determine which substances are soluble. Use test results to make predictions to set up further comparative and fair tests	Record data and results in a table. Take measurements, with a thermometer, with increasing accuracy and precision. Report and present findings from enquiries - including conclusions, causal relationships and explanations of and a degree of trust in results - in oral and written forms.	-Identify and classify materials based on their properties, such as solubility, conductivity (thermal and electrical), hardness, and transparency. -Classify materials according to whether they dissolve in water or not. -Group materials by whether they are reversible or irreversible when changed (e.g. melting vs burning). -Identify materials that are suitable for specific uses based on their properties (e.g. metals for conducting electricity, plastic for waterproofing).	Report and present findings from enquiries - including conclusions, causal relationships and explanations of and a degree of trust in results - in oral and written forms.	versatile transparent durable magnetic conductive thermal insulator degrees Celsius (℃) molecules conduction steel stone force hardness iron solute insoluble solvent dissolve soluble solution substance saturation solute evaporation filtering sieving mixture pure substance

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 5: Earth and Space	To know that the sun, moon and earth are spherical. To know that the Earth rotates in front of the Sun on an imaginary line called its axis . It takes 24 hours or one day to make a rotation. To know that when the Earth is facing the sun we get day and when it is not facing the sun we get night. To know that the moon orbits the Earth once every 27.3 days Deeper learning: To know the order of the planets from the sun.	To use a model to answer questions about how we get day and night and the seasons. Use test results to make predictions to set up further comparative and fair tests about the apparent movement of the sun across the sky.	-Take measurements to record the length of shadows at different times of the day. -Make systematic observations of the Moon over time and record changes in its appearance. -Use simple equipment (e.g. diagrams, models, apps) to help observe and record the movement of the Sun across the sky. -Record data about daylight hours and sunrise/sunset times over a period and present it in tables or graphs. -Use annotated diagrams or charts to record and compare features of planets in the solar system.	-Identify and classify planets in the solar system based on key features (e.g. size, atmosphere, surface, number of moons). -Classify celestial bodies as planets, moons, stars, or artificial satellites. -Group planets as inner (rocky) or outer (gas giants) based on their characteristics. -Identify and sort the phases of the Moon in order and classify them as waxing or waning.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific Ideas about the solar system. Justify scientific ideas about the apparent movement of the sun across the sky using relevant scientific language and diagrams. Identify scientific evidence that has been used to support or refute ideas or arguments about the movement of the moon relative to the Earth	orbit terrestrial planet Solar System spherical gas giant planets orbit season poles hemisphere axis shadow time zone sundial dial phase waxing waning eclipse moon

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 5: Forces	To know that levers and pulleys are two types of simple machines that are used to make work easier by reducing the amount of force required to move an object. To know that gears do three things: change the direction of motion, change the speed of motion and change the amount of force. To know that gravity the name for a force that pulls everything down toward the centre of the Earth. To know that air resistance is a force which acts as friction between the object and air and is the opposing force to gravity. To know that water resistance is a force which prevents an object from moving easily through the water. Deeper learning: To know the similarities and differences between air and water resistance.	To plan a comparative enquiry to compare the effectiveness of pulleys. To predict which objects will fall to the Earth quicker. To plan a fair test to determine which objects fall to the Earth quicker. Make predictions and give a reason using scientific vocabulary. Design a test to create the best parachute deciding which variable to test and which to control. Design a fair test to determine which boat move through water quicker. Design a fair test to determine which floor covering prevents people from slipping	Measure force using a forcemeter. Take measurements using a range of scientific equipment with increasing accuracy and precision. Take repeated readings and record data and results using charts and graphs.	-Identify and classify forces as contact (e.g. friction, air resistance) or non-contact (e.g. gravity, magnetism). -Classify materials and surfaces based on how much friction they produce. -Identify and group objects based on whether they sink or float, linking to upthrust and water resistance. -Sort mechanisms (e.g. levers, pulleys, gears) by the type of force they help to apply or change.	Use scientific evidence to support findings. Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas.	load pulley lever pivot fulcrum weight mass astronomy Sir Isaac Newton gravity gear mesh mechanism rack and pinion bevel gear Galileo Galilei opposing air resistance parachute streamlined upthrust buoyant water resistance sink Newton meter resistance lubricant Newton friction

	Substantive Knowledge	Disciplinary Knowledge				Vocabulary
		Questioning, predicting and planning	Observing and recording evidence	Identifying and Classifying	Analysing and evaluating	
Year 5: Living things and their habitats: life cycles	To know that mammals reproduce and give birth to live young. To know the different areas of a flowering plant and how this enables reproduction. To know that plant reproduce through pollination. To know that fertilisation occurs when male pollen joins with the female ovule.	Predict what a new cutting of a plant could turn into by drawing a diagram and recording predictions.	Describe the key features of life cycles and draw accompanying diagrams.	To identify the similarities and differences between different mammals.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific Ideas about life cycles.	reproduction asexual reproduction genes tuber fertilisation amphibian metamorphosis larva caterpillar pupa egg fledgling egg tooth embryo hatch life cycle vertebrate reproduction warm-blooded living organism

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 6: Evolution and Inheritance	To know that plants and animals have numerous adaptations which help them to survive in their habitats. To know that a characteristic describes how something looks or how it behaves. Characteristics can be passed on from parents to their offspring, meaning that they can be inherited. To know that animals adapt to suit their environment in different ways. Too know that adaptation may lead to evolution. To know that fossils provide information about living things that inhabited the Earth millions of years ago. Deeper learning: To know who Charles Darwin was and why some of his ideas were controversial.	-Ask questions about how animals and plants are adapted to their environments. - Predict how certain traits may help living things survive in different habitats. -Pose questions about how offspring inherit characteristics from parents. -Predict how environmental changes might affect future generations of a species.	-Observe features of living things and record similarities and differences within and between species. -Record data on inherited traits using diagrams, tables, or bar charts (e.g. eye colour, fur patterns). -Use annotated drawings to record features linked to adaptation (e.g. beak shape, camouflage). -Record evidence of fossils or pictures of fossils and what they tell us about living things from the past.	-Identify inherited characteristics and those influenced by the environment. -Classify animals based on observable traits that support survival in different habitats. -Group fossil images or models to show common ancestors or evolutionary links. -Sort adaptations into structural, behavioural, or functional categories.	-Compare evidence from fossil records to identify patterns of change over time. -Analyse data on variation within a species and draw conclusions about survival advantages. -Evaluate how well certain adaptations suit particular environments. -Interpret scientific diagrams or models of inheritance and evolution, identifying strengths and limitations.	variation characteristic offspring environmental inheritance nutrition climate feature adaptation habitat predator pollinate nutrients epiphytes toxic Mary Anning ichthyosaurus fossil Jurassic Coast palaeontologist natural selection extinct Charles Darwin evolve theory tool neanderthal ancestor homo sapiens primate

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 6: Light	To know that light travels in straight lines. To know that reflection occurs when light bounces off a surface and changes direction. To know that we see things because light travels from light sources to our eyes, or from light sources to objects and then to our eyes. To know that shadows have the same shape as the objects that cast them To know that the closer an object is to the light source, the bigger the shadow. The further away the object is from the shadow, the smaller the shadow. Deeper learning: To know the importance of reflective surfaces in everyday life.	Carry out a mini experiment to find out that light travels in straight lines from a light source to our eyes so that we can see. Plan different types of scientific enquiries to answer questions about light, including recognising and controlling variables where necessary Make predictions about reflective surfaces and give a reason using scientific vocabulary	Choose the most appropriate equipment in order to take measurements, explaining how to use it accurately Choose the most effective approach to record their observations about shadows and report results, linking to mathematical knowledge.	-Identify and classify materials as transparent, translucent, or opaque based on how they interact with light. -Classify objects based on whether they reflect, absorb, or transmit light. -Identify different types of light sources (natural and artificial) and classify them accordingly. -Group shadows based on their size, shape, and sharpness to identify patterns related to object distance and light direction.	Identify scientific evidence that has been used to support or refute ideas or arguments Identify the validity of conclusions about shadow length	symbol light eye light source scientific diagram surface bounce direction mirror reflected periscope line of sight angle utilise shadow block opaque transparent translucent real-life problem direction rotate plan sun shade phenomena optical disperse spectrum refraction

		Disciplinary Knowledge				
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 6: Electricity	To know that voltage is the force that pushes current around a circuit. To know that adding more cells (batteries) to a circuit will make bulbs brighter, buzzers louder and motors faster. To know that the number of components in a circuit affect the output. To know that wires are always drawn with a straight line using a ruler in scientific diagrams. Deeper learning: To know that a parallel circuit splits the current along multiple paths before meeting up again.	Plan different types of scientific enquiries to answer questions about electricity, including recognising and controlling variables where necessary. Predict whether bulbs will be brighter than the control. Use test results to make predictions to set up further comparative and fair tests.	-Observe how changes in circuit components (e.g., adding bulbs) affect brightness or current and record results. -Record the effects of opening and closing switches on a circuit using diagrams or charts. -Use tables to record which materials allow electricity to flow when tested as conductors or insulators.- Record observations of how battery power affects the performance of a circuit over time.	-Identify common electrical components (e.g., battery, bulb, switch, wires) and classify them by function. -Classify materials as conductors or insulators based on their ability to carry electric current. -Identify different types of circuits (series, parallel) and classify components according to their position and role. -Sort electrical devices by their energy sources (e.g., batteries, mains electricity, solar power).	-Analyse how changing components in a circuit affects its overall function, such as brightness of bulbs or operation of devices. -Evaluate the effectiveness of different materials as conductors or insulators based on experimental data. -Interpret circuit diagrams and models to identify potential faults or improvements. -Critically assess the safety and efficiency of everyday electrical devices and suggest ways to improve them.	circuit circuit diagram symbol battery wires voltage voltmeter brightness electricity current blown variable resistor resistor LED dimmer switch fair test variable output systematically control test timer-based sensor synchronised signal traffic light closed electric circuit conductor insulator indicating resistor

		Disciplinary Knowledge					
	Substantive Knowledge	**Questioning, predicting and planning**	**Observing and recording evidence**	**Identifying and Classifying**	**Analysing and evaluating**	**Vocabulary**
Year 6: Animals including humans (blood, the heart and the circulatory system)	To know there are three types of blood vessels: arteries, veins and capillaries. To know that the heart pumps blood, carrying nutrients and oxygen, around every part of the body. To know the functions of blood and blood vessels. To know that drugs, including alcohol, can cause liver damage, poor sleep, high blood pressure, and different types of cancer. To keep our heart and body healthy, we need to: • eat a balanced diet (not too much sugar or fat); • exercise regularly; • drink approximately 2 litres of water a day; • limit alcohol intake, in adults; • get approximately 8 hours of sleep. Deeper learning: To know what osmosis and diffusion are.	To plan a fair test to investigate the impact of restricted blood flow in humans. Make predictions and give a reason using scientific vocabulary. Conduct an experiment to explore how soaking gummy sweets in different liquids will affect the size of the sweet. Pose/select the most appropriate line of enquiry to investigate scientific questions about heart rate, diet and exercise. Select and plan the most suitable line of enquiry, explaining which variables need to be controlled and why when investigating heart rate, diet and exercise.	Record learning about the circulatory system in diagrams and written notes. Record results in a pie chart. Take accurate measurements with a ruler and record results in a table.	-Identify the main parts of the circulatory system (heart, blood vessels, blood) and classify their functions. -Classify blood vessels as arteries, veins, or capillaries based on structure and role. -Identify and group components of blood (red cells, white cells, plasma, platelets) and describe their functions. -Classify activities or lifestyle choices based on their positive or negative impact on heart health.	-Analyse data from pulse rate investigations and identify patterns linked to exercise or rest. -Evaluate the impact of different diets, habits, or activities on the circulatory system using scientific evidence. -Interpret models or diagrams of the heart and circulatory system to explain how blood flows around the body. -Compare and critique different representations of the circulatory system (e.g. diagrams, animations, models) for accuracy and clarity.	ventricle atrium vessel circulatory system valves vein capillary microscope artery blood plasma red blood cell white blood cell platelet concentration absorb osmosis diffusion nutrient pulse diet BPM - beats per minute exercise heart rate depressant stimulant hallucinogen painkiller drug