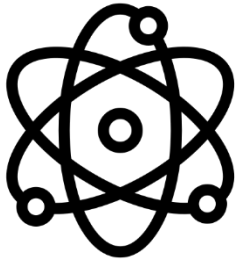
St. Gregory's Catholic Primary School

Together, in Jesus, we Love, Learn, Create and Celebrate!



'In the beginning, God created the heavens and the Earth.'

Genesis 1:1

This is an overview of the key knowledge children will accumulate as they progress in Science at St. Gregory's. Further steps in knowledge acquisition, as well as links between topics and knowledge, can be found in our Medium-Term Plans, Unit Rationales and Knowledge Organisers.

Substantive Concepts in Science

Human Biology, Light, Senses, Animals, Classification, Seasonal Change, Astronomy, Weather, Climate, Recycling, Sustainability, Human Impact, Pollution, Natural Resource, Botany, Adaptation, Materials, Magnetism, Force, Systems, Interconnection, Habitat, Interdependence, Electricity, Conductivity, States of Matter, Astronomy, Orbit, Rotation, Nutrition, Reproduction, Diversity, Geology, Properties, Gravity, Hygiene, Ecosystem, Ecology, Meteorology, Solubility, Motion, Energy, Atmosphere, Forecast, Inheritance, Variation, Evolution by Natural Selection

Substantive Concepts and Substantive (Key) Knowledge in Science

St. Gregory's Science curriculum equips children with the foundations for understanding the world through a scientific lens. Pupils are taught units of work that cover and go beyond the requirements of the National Curriculum in the specific disciplines of biology, chemistry and physics. Pupils build a body of key foundational science knowledge as they work through the curriculum, asking questions and developing a sense of curiosity about the world around us.

Our science curriculum builds knowledge incrementally. Pupils have multiple opportunities to secure and build on their knowledge and understanding as subject content is revisited at points throughout the curriculum: this helps children to master the knowledge and concepts whilst building up an extended specialist vocabulary. This incremental approach helps teachers to identify knowledge gaps and look back at previous content if they need to close gaps in knowledge or understanding. Our science curriculum enables children to understand the important role that science plays in the sustainability of life on earth. We intend for St. Gregory's children following this curriculum to be equipped to go forth into their secondary education with curiosity, passion and a desire for discovery.

Disciplinary Knowledge – Working Scientifically - in Science

Pupils will be encouraged to use the knowledge they learn in Science and apply it to investigations that test a theory or set out to answer a question. Importantly, substantive scientific knowledge is taught first, before pupils are asked to undertake enquiry. This helps them to fully understand the elements of the enquiry first, and to make informed observations about the processes they see. Gathering information, recording data, graphing data and interpreting findings are all essential skills that pupils will apply to new contexts as they work through the curriculum. Enquiries include observing over time, pattern seeking, identifying, classifying and grouping, comparative and fair testing and researching using secondary sources. Scientific enquiries provide children with a wealth of opportunities, but first and foremost they will help to deepen understanding of the nature, processes and methods of science as a discipline and how it differs from other subjects they are studying. Pupils will gain an understanding of the purpose and uses of science both today and in the future.

EYFS – Nursery Class Summary of Science						
Nursery Class	Autumn 1 **All About Me**	Autumn 2 **Journeys**	Spring 1 **Dinosaurs**	Spring 2 **Growing and Changing**	Summer 1 **Animals and their Babies**	Summer 2 **Heroes and Adventurers**
Understanding the World **The Natural World**	The season of Autumn, leaves changing colour and falling from trees. Animals begin to prepare for colder weather and hibernation e.g. squirrels bury nuts in the ground. Temperatures getting colder as winter approaches.	Plan a journey to the local park, or around the school grounds what would we see? What grows in our school, what grows in the park? People journey around the world to see different places and environments; Ernest Shakleton and his journey to the South Pole. Contrasting environments; journeys to cold places, what would we need to take with us? Look at some recent memorable journeys, e,g, Perseverance landing on Mars. (Children will learn more about	We know about dinosaurs because people have found fossils in the ground. Rocks can sometimes contain fossils that palaeontologists can study.	Plants need water and light to grow (this will be built upon throughout the curriculum) Grow plants in nursery and observe plants growing e.g. sunflowers, cress etc. Talk about how the plants change as they grow. Make observations of the world around them, describe things they have seen e.g. plants, animals, natural objects and manmade objects. Recognise the season of Spring and notice new plants growing. Animals grow and	All animals have babies, some look like their parents, but some do not. Recognise and use animals names e.g. cow/calf, chicken/chick. Polar habitats are under threat as climate changes.	Ice investigation-(link to South Pole – Shackleton). Ice changes from a solid to a liquid when it melts. Boats in water – explore floating and sinking. How many pennies can my boat hold? Contrasting landscapes; what does a lunar landscape look like? What might we see if we walked on the moon?

		space in Reception)		change in many different ways.		

EYFS – Reception Class Summary of Science						
Reception Class	Autumn 1 **All About Me**	Autumn 2 **Transport: Past and Present**	Spring 1 **Space**	Spring 2 **Growing and Changing**	Summer 1 **Kings and Queens**	Summer 2 **Stories from the Past**
Understanding the World **The Natural World**	The human body: Facial features, body parts, the senses Seasons of the year; Autumn. Deciduous and evergreen trees. Observing leaves using magnifying glasses, leaves changing colour.	Forces: push, pull, twist Air transport Water transport Seasons of the year: Winter. Animal hibernation, why do some animals hibernate? How do other animals survive winter? Transport in the winter; snow ploughs, gritting roads, snow tyres. Changing state of matter; frost and ice- looking closely at ice, what happens when it warms? Why can we see our breath when it is cold?	Our planet Earth, land and sea, plants and animals, weather, gravity. The moon, the sun, the planets in our solar system, space travel, astronauts. Seasons of the year: Spring. The first signs of spring; snowdrops, cherry blossom, buds and flowers, birds nesting, bees, lighter evenings.	Growing and changing; how people change as they grow, how animals change as they grow. Life cycles of a butterfly and/or frog. Identify and draw the following animals and their babies including but not limited to: Sheep and Lamb Cows and Calf Horse and foal Butterfly and Caterpillar Frog and tadpole Dog and puppy Cat and kitten Plants; how they grow from seeds and bulbs. What plants need to grow. Identify parts of plants including roots, stem and leaves. Identify trees and plants growing locally on the school grounds	Seasons of the Year: Summer. Signs of summer; flowers, warmer days, light evenings, butterflies, bees, birds. Design a garden for the Queen; what could we grow? What would we include? Sketch some ideas and write about the design.	Seasons of the Year: Summer. How we stay safe in the sun; sunscreen, hats, sunglasses. Safety around water. Changing state of matter; Why do our ice lollies melt?

				or in local parks. Draw pictures of local plants.		

<table>
<tr><th>Year Group</th><th>Substantive Concepts and Substantive (Key) Knowledge</th><th>Common Misconceptions and Disciplinary Knowledge (Working Scientifically)</th><th>Assessment Outcome</th></tr>
<tr><td rowspan="5">Year 1</td><td colspan="3">Y1 - The Human Body</td></tr>
<tr><td>Substantive Concepts:
Human Biology
Light
Senses</td><td>Common Misconceptions:
Light travels from our eyes
That a person is blind without their glasses
Only hands have the sense of touch.
That people cannot be partially blind or deaf.
That sight and sound are the only senses you can lose</td><td rowspan="2">To be able to label parts of the human body, recalling knowledge about the body and senses.</td></tr>
<tr><td>Substantive (Key) Knowledge:
To know that our body has five senses.
To know that we use our eyes to see.
To know that sounds travel through our ears to send messages to our brain.
To know that our senses help us to understand the world around us.
To know that some people have problems with their senses, such as blindness or deafness.</td><td>Disciplinary Knowledge/Working Scientifically:
Identifying and classifying
Using their observations and ideas to suggest answers to questions
Observing closely
Gathering data to help in answering questions
Performing simple tests</td></tr>
<tr><td colspan="3">Y1 - Animals and their Needs</td></tr>
<tr><td>Substantive Concepts:
Animals
Classification (grouping)</td><td>Common Misconceptions:
Animals are furry and have four legs.
Lizards and snakes are amphibians.
Whales and dolphins are fish as they live in the sea.</td><td rowspan="2">To understand what an animal is and how animals can be grouped.</td></tr>
<tr><td>Substantive (Key) Knowledge:
To know that some animals live in water, some live on land, some fly in the sky.
To know that scientists group animals according to their features.
To know that we can group animals according to what they eat.
To know that pets have needs: food, space, shelter, medicine and company.
To know that we can use scientific words to describe</td><td>Disciplinary Knowledge/Working Scientifically:
Using their observations and ideas to suggest answers to questions
Identifying and classifying
Recording data to help in answering questions
Asking simple questions and recognising that they can be answered in different ways</td></tr>
</table>

	animals.		
	Y1 - Seasons and Weather		
	Substantive Concepts: Seasonal Change Astronomy Weather Climate	**Common Misconceptions:** • It only snows in winter. • It is always sunny in summer. • It rains most in winter. • Flowers are only seen in spring and summer. • Clouds always lead to rain. • Dark clouds always lead to rain. • Weather forecasts are 100% accurate.	To understand and describe the four seasons, and how to gather data about weather.
	Substantive (Key) Knowledge: To know that our four seasons are spring, summer, autumn and winter. To know that tools are used to gather information about the weather. To know that data is a collection of facts. To know that there are different types of cloud. To know that weather forecasts help people to prepare for different kinds of weather. To know that certain types of weather can be dangerous.	**Disciplinary Knowledge/Working Scientifically:** • 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	
	Y1 - Taking Care of the Earth		
	Substantive Concepts: Recyciling Sustainability Human Impact Pollution Natural Resource	**Common Misconceptions:** • Air pollution is always visible. • We can make coal as fast as it is being used. • Trees are a manufactured resource because humans plant them. • Logging has no positive benefits. • Once rubbish is buried, it no longer causes any issues.	To be able to describe different ways we can take care of the Earth.
	Substantive (Key) Knowledge: To know that humans do things that can damage the Earth. To know that there are natural and manufactured resources	**Disciplinary Knowledge/Working Scientifically:** • Asking simple questions and recognising that they can be answered in different ways	

	that people on Earth use. To know that logging is a way of harvesting the Earth's natural resources. To know that people create pollution which can harm the environment. To know that recycling means turning used things into something new.	• Identifying and classifying • Using their observations and ideas to suggest answers to questions • Gathering and recording data to help in answering questions	
	Y1 - Plants		
	Substantive Concepts: Plants Seasonal Change Weather Botany	**Common Misconceptions:** • Seeds are not alive. • All plants start out as seeds. • Plants are only flowering plants with colourful petals. • Seeds need sunlight to germinate. • All leaves are green. • A trunk is not a stem. • All stems are green.	To be able to describe some common plants, including trees.
	Substantive (Key) Knowledge: To know that plants need the right temperature, light and water to grow. To know that there are different parts of a plant. To know that plants spread their seeds to make new plants. To know that some trees are evergreen, and some are deciduous. To know that we eat different parts of plants including the roots, stem, leaves and sometimes the flowers. To know that some plants are dangerous to eat and would make us ill.	**Disciplinary Knowledge/Working Scientifically:** • 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	
	Y1 - Materials and Magnets		
	Substantive Concepts: Materials Magnetism	**Common Misconceptions:** • Only fabrics are materials • The word 'rock' describes an object rather than a	To be able to recall the properties of some materials.

	Force	material • 'Solid' is another word for hard. • A material is something used for building, clothing or stationery. • Confusing absorbent with waterproof (e.g. paper towel soaking up water)	
	Substantive (Key) Knowledge: To know that objects all around us are made from types of materials. To know that properties of materials are things we can measure, see or feel. To know that materials have different properties that make them useful for different tasks. To know that materials can be sorted according to whether they are or are not attracted to magnets.	**Disciplinary Knowledge/Working Scientifically:** • 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.	

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<tr><th>Year Group</th><th>Substantive Concepts and Substantive (Key) Knowledge</th><th>Common Misconceptions and Disciplinary Knowledge (Working Scientifically)</th><th>Assessment Outcome</th></tr>
<tr><td rowspan="4">Year 2</td><td colspan="3">Y2 - The Human Body</td></tr>
<tr><td>Substantive Concepts:
Human Biology
Senses
Systems
Interconnection</td><td>Common Misconceptions:
• All animals are furry and have four legs.
• The heart is at the left side of the body.
• The stomach is located behind the navel.
• We only eat food for energy.
• All germs are harmful.
• Air tubes connect to the heart.</td><td rowspan="2">To be able to answer the question ‘Is all food healthy?’, grouping items and explaining reasoning.</td></tr>
<tr><td>Substantive (Key) Knowledge:
To know that animals, including humans, need air, food and water to survive.
To know that our skeleton and our muscles help us to move.
To know that our bodies digest our food.
To know that digestion means breaking down the food we eat.
To know that our heart pumps blood around our body.
To know that scientists have found ways to keep us healthy.
To know that we need to take care of our bodies through exercising, keeping clean, eating a balanced diet and resting.</td><td>Disciplinary Knowledge/Working Scientifically:
• Asking simple questions and recognising that they can be answered in different ways.
• Identifying and classifying.
• Using their observations and ideas to suggest answers to questions.
• Gathering and recording data to answer questions.</td></tr>
<tr><td colspan="3">Y2 – Living Things and their Environments</td></tr>
<tr><td>Substantive Concepts:
Animals
Habitat
Interdependence
Adaptation</td><td>Common Misconceptions:
• Fire is alive because it moves, grows and reproduces.
• Plants and seeds are not alive as they do not seem to move.
• Arrows in a food chain mean ‘eats’ (rather than ‘is eaten by’).
• The death in one part of a food chain has no effect on the rest of the food chain.
• Wild animals always have food available to them.
• The living thing at the top of the food chain is a predator of all other living things in the food chain.
• Animals in soil (e.g. worms, beetles) breathe by coming</td><td>To describe and give examples of different habitats and how animals and plants are adapted to living in them.</td></tr>
</table>

		to the surface. • Lions live in the jungle (likely from hearing the phrase – 'the lion is the king of the jungle'). • All deserts are sandy.	
	Substantive (Key) Knowledge: To know that there is difference between living, dead and never been alive. To know that a habitat is the name given to a place where plants or animals live. To know that rainforests are hot and moist, and deserts are dry and hot or cold. To know that each habitat has plants and animals adapted to survive. To know that some animals live in underground habitats. To know that a food chain describes 'who eats what' within a habitat.	**Disciplinary Knowledge/Working Scientifically:** • Using their observations and ideas to suggest answers to questions. • Identifying and classifying. • Gathering and recording data to help in answering questions. • Observing closely, using simple equipment. • Asking simple questions and recognising that they can be answered in different ways.	
	Y2 - Electricity		
	Substantive Concepts: Electricity Conductivity	**Common Misconceptions:** • Batteries have electricity inside them. • Electricity flows out of both ends of a battery. • Electricity works by coming out of one end of a battery (unipolar model).	To be able to draw a circuit with symbols for key components, explaining what is happening when the circuit is connected.
	Substantive (Key) Knowledge: To know that many things around us use electricity to make them work. To know that electricity is energy that we can store or use to make things work. To know that electricity is useful, but it can also be dangerous. To know how to construct an electrical circuit. To know that materials either do or do not allow electricity to pass through them.	**Disciplinary Knowledge/Working Scientifically:** • 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.	

<table>
<tr><td rowspan="5"></td><td colspan="3"><u>Y2 - Plants</u></td></tr>
<tr><td><u>Substantive Concepts:</u>
Plants</td><td><u>Common Misconceptions:</u>
• Seeds are not alive.
• All plants start out as seeds.
• Seeds and bulbs need sunlight to germinate.</td><td rowspan="2">To be able to describe how seeds and bulbs grow into mature plants.</td></tr>
<tr><td><u>Substantive (Key) Knowledge:</u>
To know there are many different kinds of plants.
To know that seeds and bulbs grow into mature plants.
To know that healthy plants need light and water to grow.
To know that plants are grown for food.</td><td><u>Disciplinary Knowledge/Working Scientifically:</u>
• 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.</td></tr>
<tr><td colspan="3"><u>Y2 – Materials and Matter</u></td></tr>
<tr><td><u>Substantive Concepts:</u>
Materials
Magnetism
States of Matter</td><td><u>Common Misconceptions:</u>
• Materials are only used for building, clothing or stationery.
• The word rock is an object rather than a material.
• Solid is another word for hard.
• Solids made of small pieces that can be poured are liquids.</td><td rowspan="2">To be able to describe different materials and their properties.</td></tr>
<tr><td><u>Substantive (Key) Knowledge:</u>
To know that materials have specific uses based on their properties.
To know that inventors think carefully about materials and their properties.
To know that scientists use microscopes to see very small things around us.
To know that the shapes of solid objects made from some materials can be changed.</td><td><u>Disciplinary Knowledge/Working Scientifically:</u>
• 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</td></tr>
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	To know that water can be a solid and can also be a liquid.	questions.	
	Y2 - Astronomy		
	Substantive Concepts: Astronomy Orbit Rotation	**Common Misconceptions:** • Earth is at the centre of the solar system and other planets orbit it. • The Sun, Moon and Earth are a similar size. • Pluto is a planet. • The Sun is a planet. • Earth is flat . • The Sun orbits the Earth and that's how we get night and day. • The Sun simply rises upwards in the morning and then goes downwards in the evening. • The Sun moves across the sky during the day. • Night is caused by the Moon getting in the way of the Sun. • The Earth's shadow is responsible for the phases of the Moon. • The Moon only appears at night.	To be able to show understanding of some information that scientists know about our Solar System.
	Substantive (Key) Knowledge: To know that there are eight planets in our solar system. To know that Earth travels around the Sun. To know that the Moon orbits the Earth. To know that groups of stars are called constellations. To know that scientists, including astronomers, learn from each other to make new discoveries about space.	**Disciplinary Knowledge/Working Scientifically:** • Asking simple questions and recognising that they can be answered in different ways. • Identifying and classifying. • Using their observations and ideas to suggest answers to questions.	

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<tr><td rowspan="5">Year 3</td><td colspan="3">Y3 - The Human Body</td></tr>
<tr><td>Substantive Concepts:
Human Biology
Systems
Interconnection
Nutrition</td><td>Common Misconceptions:
• Around the word ‘nervous’ in the nervous system.
• The stomach is located behind the navel.
• The digestive system has different ‘tubes’ for urine and faeces (linking eating solids to making faeces and drinking liquids to making urine). • We only eat food for energy.</td><td rowspan="2">To be able to describe one of the many systems in our body.</td></tr>
<tr><td>Substantive (Key) Knowledge:
To know that we can control our voluntary muscles, but we do not control our involuntary muscles.
To know our bones help us to move and protect some parts of our bodies.
To know that the brain is the centre of the nervous system.
To know that animals get nutrition from what they eat.
To know that the purpose of digestion is to break down food enough that it can be processed in the body.</td><td>Disciplinary Knowledge/Working Scientifically:
• Asking relevant questions.
• Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
• Using straightforward scientific evidence to answer questions.
• Identifying differences, similarities or changes related to simple scientific ideas and processes.
• Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
• Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.</td></tr>
<tr><td colspan="3">Y3 – Cycles in Nature</td></tr>
<tr><td>Substantive Concepts:
Orbit
Rotation
Seasonal Change
Plants
Migration
Interconnection
Reproduction</td><td>Common Misconceptions:
• It always snows in winter.
• It is always sunny in summer.
• There are only flowers in spring and summer.
• Plants are not alive as they do not move.
• Plants get their food from the soil.
• Flowers are just decorative and not a vital part of reproduction.</td><td rowspan="2">To be able to show knowledge and understanding, explaining two different cycles in nature (animals/plants).</td></tr>
<tr><td>Substantive (Key) Knowledge:
To know that our natural environment changes as the</td><td>Disciplinary Knowledge/Working Scientifically:
• asking relevant questions and using different types of</td></tr>
</table>

	seasons change. To know that plants can change and grow through the different seasons. To know that plants grow, live and reproduce. To know that some animals migrate. To recognise the different stages in the life cycle of a frog.	scientific enquiries to answer them. • 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 straightforward scientific evidence to answer questions or to support their findings. • Identifying differences, similarities or changes related to simple scientific ideas and processes. • 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. • Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. • Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.	
	Y3 - Light		
	Substantive Concepts: Light Materials Rotation Orbit Energy	**Common Misconceptions:** • We can still see even where there is an absence of any light. • Our eyes 'get used to' the dark. • Light is only found in bright areas. • We see things because light travels from our eyes to objects. • The moon and reflective surfaces are light sources. • A transparent object is a light source. • Shadows contain details of the object and not just the	To be able to show understanding of why light is essential for life on Earth.

		outline. • Shadows result from objects giving off darkness.	
	Substantive (Key) Knowledge: To know that we need light in order to see things. To know that transparent materials let light through and opaque materials block light from passing through. To know that opaque materials block light from passing through them. To know that mirrors can reflect light in different ways, depending on their shape. To know that shadows change in size and shape throughout the day.	**Disciplinary Knowledge/Working Scientifically:** • 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.	
	Y3 - Plants		
	Substantive Concepts: Plants Botany Diversity Interconnection Reproduction	**Common Misconceptions:** • Flowers are decorative rather than a vital part of reproduction. • Plants eat food. • 'Food' comes only from the soil via the roots. • Plants only need light to keep them warm.	To be able to recall knowledge of how flowering plants reproduce.

		• Roots suck in water which is then sucked up by the stem.	
	Substantive (Key) Knowledge: To know that flowering plants all have roots, a stem or trunk, but do not all look the same. To know that different plants need different amounts of things in order to thrive. To know that water moves from the roots of a plant, upwards via the stem. To know that pollination is needed for flowering plants to reproduce. To know that plants spread their seeds in many different ways to reproduce.	**Disciplinary Knowledge/Working Scientifically:** • 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. • Identifying differences, similarities or changes related to simple scientific ideas and processes. • Using straightforward scientific evidence to answer questions or to support their findings.	
	Y3 - Rocks		
	Substantive Concepts: Physical Properties Geology	**Common Misconceptions:** • Man-made substances such as concrete and brick are rocks. • All rocks are hard. • Rocks have to be big as smaller ones are stones or pebbles. • Minerals are precious, shiny stones. • Rocks are always dull colours. • All rocks are heavy and are solid with no holes. • A fossil is an actual piece of the animal or plant.	To be able to recall knowledge and show understanding of what can rocks tell a geologist about our planet.

		• Artefacts like pottery or coins are fossils. • Soil and compost are the same thing.	
	Substantive (Key) Knowledge: To know that there are many different types of rocks. To know that geologists sort rocks into three main groups. To know that some rocks allow water to pass through, but others do not. To know that some rocks contain fossils which can tell us about life millions of years ago. To know that soils are made from rocks and organic matter.	**Disciplinary Knowledge/Working Scientifically:** • 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.	
	Y3 – Forces and Magnets		
	Substantive Concepts: Forces Magnetism Gravity Motion	**Common Misconceptions:** • Heavier objects fall faster as they have more gravity acting on them. • Forces always act in pairs which are equal and opposite. • A stationary object has no forces acting on it. • A moving object has a force pushing it forwards and it	To be able to explain that we cannot see forces, but we can see the impact they have, using examples of gravity, friction and

		stops when the pushing force runs out. • Smooth surfaces have no friction. • Objects always travel better on smooth surfaces. • The bigger the magnet, the strong it is. • All metals are magnetic.	magnetism.
	Substantive (Key) Knowledge: To know that a force is a push or a pull. To know that friction is the force between two surfaces. To know that magnets have an invisible push or pull force. To know that magnets have poles and a magnetic field. To know that magnetic forces are not all the same strength.	**Disciplinary Knowledge/Working Scientifically:** • 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.	

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<tr><th>Year Group</th><th>Substantive Concepts and Substantive (Key) Knowledge</th><th>Common Misconceptions and Disciplinary Knowledge (Working Scientifically)</th><th>Assessment Outcome</th></tr>
<tr><td rowspan="4">Year 4</td><td colspan="3">Y4 - The Human Body</td></tr>
<tr><td>Substantive Concepts:
Systems
Nutrition
Hygiene</td><td>Common Misconceptions:
All teeth have the same function.
The stomach is located behind the navel.
The digestive system has different ‘tubes’ for urine and faeces (linking eating solids to making faeces and drinking liquids to making urine).
Sugar is only in bad food.
All fat is bad for you.
Food only contains fat if the fat can be seen (e.g. on meats).
All dairy products are good for you.</td><td rowspan="2">To recall knowledge to be able to design a healthy meal and explain its journey from our mouth through the digestive system.</td></tr>
<tr><td>Substantive (Key) Knowledge:
To know that cells are the building blocks of the human body and we need nutrition to keep our bodies working as they should.
To know that there are four main different types of teeth: incisors, canines, pre-molars and molars.
To know that the brain and mouth start the digestive process.
To know that food is digested and excreted.
To know that there are essential vitamins and minerals needed for our bodies.</td><td>Disciplinary Knowledge/Working Scientifically:
Identifying differences, similarities or changes related to simple scientific ideas and processes.
Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
Asking relevant questions and using different types of scientific enquiries to answer them.
Setting up simple practical enquiries, comparative and fair tests.
Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</td></tr>
<tr><td colspan="3">Y4 – Classification of Plants and Animals</td></tr>
<tr><td>Substantive Concepts:
Classification
Plants
Animals</td><td>Common Misconceptions:
Animals are only creatures that live on land.
Humans are not animals.
Insects are not animals.</td><td>To be able to recall knowledge to show understanding that plants and animals</td></tr>
</table>

	Reproduction	• All bugs or creepy crawlies, including spiders, are insects. • A bee (or any other insect) is not an animal because it is an insect. • Insects have legs attached to each body segment. • Confusing amphibians for reptiles and vice versa – lizards and snakes are amphibians. • Whales and dolphins are fish, not mammals. • A crab is a vertebrate because it has a hard shell on its back. • A snake is like a worm, so it is an invertebrate.	can be classified according to characteristics.
	Substantive (Key) Knowledge: To know that we can classify animals and plants. To know that a vertebrate is an animal with a backbone. To know that an invertebrate is an animal without a backbone. To know that fish and amphibians are vertebrates. To know that there are some key different features of reptiles, birds and mammals. To know key features of insects, arachnids and molluscs. To know that plants can be classified into two main groups: flowering and non-flowering.	**Disciplinary Knowledge/Working Scientifically:** • Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. • Identifying differences, similarities or changes related to simple scientific ideas and processes. • Asking relevant questions and using different types of scientific enquiries to answer them. • Using straightforward scientific evidence to answer questions or to support their findings. • Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.	
	Y4 - Ecology		
	Substantive Concepts: Interconnection Ecosystem Human Impact Pollution Ecology Habitat	**Common Misconceptions:** • Fire is alive. • The death in one part of a food chain has no effect on the rest of the food chain. • Wild animals always have food available to them. • All changes to habitats are negative. • Arrows in a food chain mean ‘eats’ (rather than ‘is eaten by’). • The living thing at the top of the food chain is a predator	To be able to recall knowledge to show understanding of ecology and human impact.

		of all other living things in the food chain. • Air pollution is always visible.	
	Substantive (Key) Knowledge: To know that living things depend on their habitats. To understand that living things are linked within a food chain. To know that living things depend on each other in an ecosystem. To understand that air pollution is a human threat to the environment. To know that humans have changed the environment in our local area.	**Disciplinary Knowledge/Working Scientifically:** • 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. • Identifying differences, similarities or changes related to simple scientific ideas and processes. • Using straightforward scientific evidence to answer questions or to support their findings.	
	Y4 - Sound		
	Substantive Concepts: Light Sound Senses	**Common Misconceptions:** • Sound travels only to the listener. • For a sound to be heard fully, the listener has to concentrate on it. • Sound only travels in one direction from the source. • Sound can't travel through obstacles (solids) and liquids. • High sounds are loud and low sounds are quiet.	To be able to recall knowledge about sound: what it is, how it is made and how it travels.
	Substantive (Key) Knowledge: To know that sound is caused by a back and forth movement	**Disciplinary Knowledge/Working Scientifically:** • Asking relevant questions and using different types of	

	called vibration. To know sound travels through the air. To know that there is a difference between pitch and volume. To know that the human voice makes different sounds. To know that vibrations in sound waves travel through the different parts of the ear.	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.	
	<u>Y4 – States of Matter and The Water Cycle</u>		
	<u>Substantive Concepts:</u> Meteorology Weather Climate Matter Gravity Atmosphere	**<u>Common Misconceptions:</u>** • Confusing steam and water vapour. • Solid is another word for hard. • Solids are hard and cannot break, change shape easily and are usually in one piece. • Water in its different forms (i.e. ice, water, vapour) is different substances. • Particles in liquids are further apart than in solids and they take up more space. • Clouds are made of water vapour.	To be able to explain how water changes state within the water cycle.

		• The changing states of water are irreversible. • Melting is the same as dissolving. • Evaporating water makes it disappear. • The substance on a can of drink is condensation rather than water.	
	Substantive (Key) Knowledge: To know that there are three main states of matter: solid, liquid and gas. To know that evaporation occurs when a liquid turns into gas. To know that condensation occurs when gas turns into liquid (water vapour into liquid water). To know that precipitation returns water to the surface of the Earth. To know that there are different ways that water changes state within the water cycle.	**Disciplinary Knowledge/Working Scientifically:** • 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. • Identifying differences, similarities or changes related to simple scientific ideas and processes. • Using straightforward scientific evidence to answer questions or to support their findings.	
	Y4 - Electricity		
	Substantive Concepts: Electricity Conductivity Energy	**Common Misconceptions:** • Electricity only comes from the mains/batteries. • Confusing between battery and cell • Electricity flows to bulbs, not through them. • Electricity flows out of both ends of a battery. • Electricity works by coming out of one end of a cell. • Bigger batteries make bulbs brighter. • Components in a circuit closer to a cell get more electricity.	To be able to describe ways in which electricity is important in our lives.

	Substantive (Key) Knowledge: To know that electricity is useful, but it can also be very dangerous. To know that an electrical circuit is a loop that allows electricity to travel around it. To know than an electrical circuit must have wires and a battery. To know that, if a circuit is broken, electricity will not be able to flow around it. To know that switches open and close a circuit. To know that the lightbulb was a very important invention. To know that materials either do or do not allow electricity to pass through them.	**Disciplinary Knowledge/Working Scientifically:** • 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.	

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<tr><td rowspan="5">Year 5</td><td colspan="3">Y5 - The Human Body</td></tr>
<tr><td>Substantive Concepts:
Human Biology
Physical Change</td><td>Common Misconceptions:
• Only males grow armpit hair.
• Puberty starts at the same time for everyone.</td><td rowspan="2">To be able to describe the main stages of growth in humans, from conception to old age.</td></tr>
<tr><td>Substantive (Key) Knowledge:
To know that there are three early stages of human growth: gestation, birth and infancy.
To know that the human body changes as it goes through puberty.
To know that there are physical and mental changes to the human body that happen from adulthood to old age.
To know that humans and animals have growth stages of different lengths.</td><td>Disciplinary Knowledge/Working Scientifically:
• Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
• Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.
• Identifying scientific evidence that has been used to support or refute ideas or arguments.
• Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</td></tr>
<tr><td colspan="3">Y5 - Materials</td></tr>
<tr><td>Substantive Concepts:
Materials
Conductivity
Solubility</td><td>Common Misconceptions:
• A material is used for clothing or building.
• Thermal insulators keep cold in or out.
• Thermal insulators warm things up.
• Solids dissolve in liquids have vanished and you cannot get them back.
• A lit candle simply melts which is reversible.</td><td rowspan="2">To be able to describe how they would separate a mixture of pebbles, iron nails, salt and water, using diagrams and written explanation.</td></tr>
<tr><td>Substantive (Key) Knowledge:
To know that materials can be grouped according to their properties and to know the definitions of some properties.
To know that thermal conductivity means heat can be transferred through a material.</td><td>Disciplinary Knowledge/Working Scientifically:
• Identifying scientific evidence that has been used to support or refute ideas or arguments.
• Reporting and presenting findings from enquiries, including conclusions, causal relationships and</td></tr>
</table>

	To know that a solution is a mixture of a solid in a liquid where the solid has broken into parts too small to see. To know there are methods for separating mixtures including solutions. To understand that all changes are either reversible or irreversible.	explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations. • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • 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. • Using test results to make predictions to set up further comparative and fair tests.	
	Y5 – Living Things		
	Substantive Concepts: Seasonal Change Plants Animals Interconnection Reproduction	**Common Misconceptions:** • All plants start out as seeds. • All plants have flowers. • Plants that grow from bulbs do not have seeds. • Only birds lay eggs. • All mammals give birth to young (e.g. platypus doesn't).	To be able to compare and contrast the life cycles of two or more living things, explaining how living things grow and reproduce, continuing in a cycle of life.
	Substantive (Key) Knowledge: To know that plants and animals in our local area change throughout the year. To know that mammals and amphibians have different life cycles. To know that insects and birds have different life cycles. To know that flowering plants need pollen to reproduce. To know that Jane Goodall and David Attenborough have dedicated their lives to studying the natural world and communicating their findings.	**Disciplinary Knowledge/Working Scientifically:** • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other	

		presentations. • Identifying scientific evidence that has been used to support or refute ideas or arguments	
	Y5 - Forces		
	Substantive Concepts: Forces Magnetism Gravity	**Common Misconceptions:** • Heavier objects fall at greater speeds than lighter objects. • Forces always act in pairs that are equal. • If an object is moving, more force is being applied in the direction it is moving. • An object at rest has no forces acting on it. • There is no gravity on the moon. • Gravity is stronger the further off the ground something is. • Smooth surfaces have no friction. • Objects always travel better on smooth surfaces.. • The heavier an object is, the faster it falls because more gravity is acting on it. • The best place to put the fulcrum is in the centre of the lever.	To be able to explain how forces work using diagrams to show understanding.
	Substantive (Key) Knowledge: To know that a force is either a push or a pull; it can cause an object to increase speed, decrease speed, change direction, change shape. To know that friction occurs when two objects move against each other, including air resistance and water resistance. To know that objects with a large surface area will have greater air resistance than other objects with a small surface area. To know that simple machines help us to increase the force we apply to an object to help us move it.	**Disciplinary Knowledge/Working Scientifically:** • 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 a 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	
	Y5 - Astronomy		
	Substantive Concepts: Astronomy Motion Force Energy Matter Space	**Common Misconceptions:** • The universe has stopped expanding. • The Moon has zero gravity. • Confusing mass and weight. • Pluto is a planet. • The Sun is a planet. • The Sun rotates around the Earth. • Earth is at the centre of the solar system. • Earth, the Sun and the Moon are a similar size. • The Moon only appears at night. • Earth's shadow is responsible for the phases of the Moon. • The Moon is a similar size to Earth. • Night is caused by the Moon getting in the way of the Sun. • The only planets that exist are in our solar system. • The Milky Way is the only galaxy.	To be able to share knowledge about how astronomers think the universe started and what has happened since.
	Substantive (Key) Knowledge: To know that astronomers believe the universe began with the Big Bang, and that it is still expanding today. To know that gravity is a force that holds objects together. To know the planets of our solar system. To know that there are different phases of the Moon. To know that the solar system is just a small part of our	**Disciplinary Knowledge/Working Scientifically:** • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • Identifying scientific evidence that has been used to support or refute ideas or arguments.	

	universe.		
	Y5 - Meteorology		
	Substantive Concepts: Weather Climate Atmosphere Forecast Meteorology	**Common Misconceptions:** • Meteorology is the study of meteors. • Confusing thunder and lightning. • Clouds are made of water vapour.	
	Substantive (Key) Knowledge:	**Disciplinary Knowledge/Working Scientifically:** • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations. • Identifying scientific evidence that has been used to support or refute ideas or arguments.	

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<tr><td rowspan="4">Year 6</td><td colspan="3">Y6 - The Human Body</td></tr>
<tr><td>Substantive Concepts:
Human Biology
Systems
Hygiene
Nutrition
Interconnection</td><td>Common Misconceptions:
That blood in veins can be blue (as shown in diagrams demonstrating deoxygenated blood).
The heart lies at the left side of the chest.
Exercise is the only time when the heart beats quicker.
All drugs are bad.</td><td rowspan="2">To be able to explain why our circulatory system is important and how we can help our bodies to stay healthy.</td></tr>
<tr><td>Substantive (Key) Knowledge:
To know that the heart pumps blood around the body.
To know that blood vessels transport blood around the body.
To know that heart rate can speed up or slow down, depending on what is happening to the body.
To know that there are many things that can be varied and changed in an experiment; we call the things we can change variables.
To know that blood is made up of different components.</td><td>Disciplinary Knowledge/Working Scientifically:
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.
Identifying scientific evidence that has been used to support or refute ideas or arguments.
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.</td></tr>
<tr><td colspan="3">Y6 – Classification of Living Things</td></tr>
<tr><td>Substantive Concepts:
Classification
Plants
Animals
Systems</td><td>Common Misconceptions:
Mushrooms are plants.
All micro-organisms are harmful.
Insects are not animals.
Humans are not animals.
A crab is a vertebrate because it has a hard shell on its back.</td><td>To be able to classify animals based on specific characteristics and give reasons.</td></tr>
</table>

		• Snakes are like worms, so they are invertebrates.	
	Substantive (Key) Knowledge: To know that there are five kingdoms of organisms. To know that plant and animal cells are different. To know that taxonomy is used to show how organisms are related to each other. To know that vertebrates are classified into five groups: fish, amphibians, reptiles, birds and mammals. To know that scientists divide invertebrates into groups including insects, arachnids and molluscs.	**Disciplinary Knowledge/Working Scientifically:** • Identifying scientific evidence that has been used to support or refute ideas or arguments. • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations. • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	
	Y6 - Electricity		
	Substantive Concepts: Electricity Conductivity Energy	**Common Misconceptions:** • Electricity works by coming out of one end of a cell. • Electricity comes out of both ends of a cell. • A circuit uses up electric current (rather than electric energy). • Voltage makes a circuit work by travelling around the wires. • Bigger batteries make bulbs brighter. • Components in a circuit that are closer to the battery get more electricity.	To be able to design and make a circuit for a purpose.
	Substantive (Key) Knowledge: To know that electricity can flow from one place to another; this is called electrical current. To know that the brightness of a lamp or the volume of a buzzer depends on the number and voltage of cells used in a circuit. To know that switches control the flow of electricity in a circuit. To know that circuits can be used to make electrical toys.	**Disciplinary Knowledge/Working Scientifically:** • 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 a 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.	
	Y6 - Light		
	Substantive Concepts: Light Materials Rotation Orbit Energy	**Common Misconceptions:** • We can still see when there is an absence of light. • Light is only found in bright areas. • The moon and reflective surfaces are light sources. • We see things because light travels from our eyes to objects. • Our eyes 'get used' to the dark. • Shadows contain details of the object and not just the outline. • Shadows result from objects giving off darkness.	'It is important to understand how light behaves.' To be able to explain why a scientist might say this.
	Substantive (Key) Knowledge: To know that light is a source of illumination that allows us to see. To know that light enters our eyes, enabling us to see. To know that light travels in straight lines. To know that shadows are always the same shape as the object that made them. To know that scientists call the light that comes from the sun 'white light'; it is made up of all the colours of the rainbow. To know that a periscope uses mirrors to reflect an image of something out of sight.	**Disciplinary Knowledge/Working Scientifically:** • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. • Using test results to make predictions to set up further comparative and fair tests. • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • Reporting and presenting findings from enquiries, including conclusions, causal relationships and	

		explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations. • Identifying scientific evidence that has been used to support or refute ideas or arguments.	
	Y6 - Reproduction		
	Substantive Concepts: Physical Change Reproduction Plants Animals	**Common Misconceptions:** • Asexual reproduction always produces exact clones (mutation in DNA can cause variation). • Flowers are decorative rather than a vital part of reproduction. • Male offspring take after their fathers and female offspring take after their mothers.	To be able to explain asexual and sexual reproduction in plants using observations of their long-term experiment (also making reference to similarities and differences for reproduction in animals).
	Substantive (Key) Knowledge: To know that asexual reproduction does not require male and female cells. To know that most flowering plants reproduce through sexual reproduction. To know that many plants clothe their seeds with fruit. To know that animals can reproduce sexually. To know that different animals have different growth stages.	**Disciplinary Knowledge/Working Scientifically:** • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations. • Identifying scientific evidence that has been used to support or refute ideas or arguments.	
	Y6 - Evolution		
	Substantive Concepts: Inheritance Variation Adaptation	**Common Misconceptions:** • A fossil is an actual part of the extinct animal or plant. • Artefacts like pottery or coins are fossils. • Fossils are only of animals and not plants.	To be able to respond to a quote from Alfred Wallace, recalling knowledge to provide

	Evolution by Natural Selection Habitat Reproduction	• Cavemen and dinosaurs were alive at the same time. • Offspring most resemble their parent of the same sex. • An example of variation is that a dog looks different to a cat. • Confusing environmental and inherited factors. • All characteristics can be inherited (e.g. sporting ability or dyed hair). • Adaptation occurs during an animal's lifetime. • Humans evolved from chimpanzees. • An example of variation is that a dog looks different to a cat. • Evolution is a theory about the origin of life. • Evolution implies life evolved randomly or by chance. • Evolution means living things are always getting better. • Natural selection acts for the good of the population	meaning through explanation and illustration.
	Substantive (Key) Knowledge: To know that fossils are physical evidence of life from long ago. To know that offspring are usually similar, but not identical, to their parents. To know that living things can adapt to suit their environment. To know that Charles Darwin is history's most famous biologist. To know that natural selection is when animals and plants have adapted well to an environment to increase chances of survival. To know that Charles Darwin wrote about his theory of evolution after spending years observing, comparing and analysing plants and animals. To know that Alfred Wallace contributed to the theory of evolution.	**Disciplinary Knowledge/Working Scientifically:** • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations. • Identifying scientific evidence that has been used to support or refute ideas or arguments.	
