

Skills Overview: Science

Science Rationale:

At St Peter's, we aim to equip all our children with the foundations for understanding the world through a scientific lens. Pupils will be taught units of work that cover and go beyond the requirements of the National Curriculum in the disciplines of biology, chemistry and physics. Pupils will encounter a range of people who have made significant contributions to the field of science and have helped shape our world. This will create a culture where pupils will be inspired to become the scientists of the future.

Pupils will build a body of scientific knowledge as they work through our curriculum. They will learn to ask informative and probing questions. They will also develop a sense of curiosity about the world around us. This will give our children an introduction to fascinating content such as; the inner workings of the human body, animals and the environments they live in, plants and their features, forces in nature, what lies beyond the visible and what lies beyond the planet we live on. Over time their knowledge will deepen, moving from recognising and naming parts of the human body to understanding how our muscles work, how our blood moves around our body and how our nervous system helps us to interact with the world.

Throughout our science curriculum, knowledge is built year on year in a progressive format. 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 lessons are presented in small steps, clearly explained to modelled to reduce cognitive load and encourage children to retain the knowledge that is taught. The aims of each lesson are to provide a clear learning outcome whilst still inspiring a love for science and the history behind it.

Pupils will be encouraged to use the knowledge they learn in Science and apply it across the curriculum. They will test out theories they have learnt in practical experiments. In our curriculum, scientific knowledge is taught first before pupils undertake enquiries. This helps pupils understand the elements of enquiry first, and to make informed observations about the changes they see. As a result of this, pupils are able to gather information, record data and present their findings in various formats such as graphs, posters, presentations and written conclusions forming links between the English and Maths curriculum.

WHOLE SCHOOL SCIENCE OVERVIEW

	Autumn 1 - The Human Body	Autumn 2 - Cycles in Nature	Spring 1 - Light	Spring 2 - Plants	Summer 1 - Rocks	Summer 2 - Forces and Magnets
Year 3	Lessons: • The Muscular System • The Skeletal System • The Nervous System • Preparing to Eat • The Digestive System In Year 3 children will learn about voluntary and involuntary muscles and their purpose. They will learn that some muscles, like our heart, move without us consciously thinking about it, but other muscles require us to command them to move. Moving forward with their understanding, children will look in more detail at the skeletal system, building on prior knowledge and elaborating through studying names of bones, joints and their function. Learning names of bones and muscles will be useful as children move through the science curriculum and in other subjects such as PE. Building on their understanding of body systems, children will learn about the nervous system. They will learn that our brain is an organ that acts as the command centre for the many messages that run around our body through our nervous system. They will	Lessons: • The Four Seasons (prior learning) • Seasonal Cycles in Plants • Life Cycle of a Plant • Animal Migration • Life Cycle of a Frog Building on their understanding of the environment, plants and animals from previous units, children will learn about cycles in nature. They will study patterns, trends and cycles that occur throughout the seasons, in the life of plants and in the life of animals. Children will understand that the tilt of the earth creates our seasons. This knowledge will be built upon in the Year 5 unit on Astronomy. Children will ask and answer questions about the patterns seen in nature as the seasons change. They will look closely and observe changes in the seasons in their own environment. Children will think scientifically about the changes to plants through the seasons, how the increased hours of sunshine in the summer help plants to gain the necessary energy to grow bigger.	Lessons: • Light and Dark • Transparent and opaque surfaces • Mirrors and reflection • Shadows • Finding patterns in changing shadows In this unit children will learn that light is an energy that enables us to see, and interact with, the world around us. They will learn there are many different sources of light and the light of the sun is vital for life on earth. Children will work scientifically to find out if materials are transparent or opaque using torches. They will learn that light travels in straight lines and sometimes bounces off from an object or material and that scientists call this reflection. There are frequent opportunities for observing and investigating how light behaves and how materials interact with light during this unit. Going beyond the requirements of the National Curriculum at this stage, children will have the opportunity to investigate mirrors and how light reflects from plane, concave and convex mirrors. Working scientifically, children will	Lessons: • Botany and Flowering Plants • Requirements for life and growth • Water transportation in plants • Pollination in Flowering Plants • Seed Dispersal This unit builds on directly from Year 2 Plants where pupils learned how to observe and describe seeds and bulbs, found out what plants need to grow and also learned how plants are grown by farmers as crops for people to eat. In this unit, pupils will look more closely at flowering plants, their features and the functions of their features. Pupils will learn that the scientific study of plants is called botany and that what we understand about plants comes from contributions from many botanists over the years. The reason for this is to show real scientists study plants. They look closely at plant specimens, draw and annotate pictures and diagrams, go into the world to look for plants and vitally ask questions about how plants behave, for example how they reproduce. Therefore, when	Lessons: • Sorting rocks. • How Rocks are Formed • Permeability • Fossils • Soil This unit introduces key knowledge of rocks including their appearance and simple physical properties. It introduces key substantive knowledge, particularly recognising different types of rock. The unit also introduces disciplinary geology knowledge and how geologists work to find out more about rocks on earth and beyond. Pupils will learn that a geologist is a scientist who studies rocks and will be introduced to some of the things that geologists might study, such as properties of rocks, composition of rocks, and what rocks can tell us about life on earth long ago. When learning about how sedimentary rock forms, children will learn that fossils form when things that have lived are trapped within rock and how this process allows us to learn about plants and animals from thousands and millions of years ago.	Lessons: • Forces (Gravity) • Friction • Magnet • Magnetic Poles and Fields • Investigating the strength of magnets This unit introduces pupils to simple forces, including magnetism. This unit will build substantive science knowledge about how forces, such as gravity and magnetism behave. In this unit, pupils will be introduced to forces and will firstly learn about gravity and friction. They will begin to understand the concept that scientists draw conclusions about things they cannot see, like forces, from looking at the effects they have. For example, we cannot see gravity, but we can see a ball fall to the ground when we drop it. Pupils will learn that Sir Isaac Newton was a scientist who thought about why things fall when dropped and developed lots of ideas about the force of gravity. This will help pupils to develop their disciplinary knowledge, considering how scientists observe and reflect on what they notice before suggesting theories.

	understand the importance of our spinal cord which runs through our backbone and the web of nerves that connect to it. Children will learn about reflex actions and their importance if part of our body is in danger. Children will continue to build on their knowledge of the digestive system, children will learn the key parts of the system including the mouth, oesophagus, stomach, small intestine, large intestine and anus. They will also look at types of teeth and their functions including incisors, canine, premolars and molars. At the end of this unit, children will understand that our bodies are made up of systems that work alongside each other to keep us alive, moving and healthy.	Children will look at the different types of trees and recognise how the seasons and animal migration patterns are interconnected. Building on their understanding of cycles, children will study the life cycles of plants and animals, specifically flowering plants and frogs. Additional life cycles of living things can be added to add further context. Metamorphosis is introduced as children learn about the changes in the life cycle of frogs. Children will identify the function of different parts of flowering plants and will explore the part that flowers play in the reproduction of flowering plants. This knowledge will be revisited in more detail in a later Year 3 unit studying plants.	plan and undertake an investigation to answer the question, 'Do shadows stay the same throughout the day?' Planning this investigation will require children to think about the best ways to investigate things, how to make sure their investigation is fair, and how to record their findings. Children should understand that the Earth is rotating on an axis, the sun is not orbiting the earth as it may appear from the sun seeming to move across our sky. Children will understand that the sun's position in our sky determines the shape and size of our shadows. Children will see a time-lapse video of a sundial and will learn that this way of measuring time was used thousands of years ago. At the end of the unit, children will show their learning and understanding of shadows through either drawing a scientific diagram with a short written explanation or an extended piece of writing that answers the question 'Why is light important?' Drawing scientific diagrams and organising writing to explain something will help children to understand how scientists work and communicate their thinking. Alongside the link to History with sundials, this unit also links to Visual Arts in Year 4 where children look at how artists represent shadows in their work.	pupils go on to do some of these things in the subsequent lessons within this unit, they will understand that these tasks require scientific thinking, questioning, exploring and analysing. As pupils work through this unit, they will continue to build an understanding of the diversity of life on Earth. They will also learn that plants have differing needs. . They will recognise that plants grow in diverse environments around the world and even within a garden, there are some plants better suited to particular places than others. Pupils will go on to focus on how plants transport water from their roots to the rest of the plant. This unit also covers pollination and seed dispersal, two vital parts of the life cycle of a plant. Pupils will learn how animals such as bees are vital for the pollination process and also, in some instances, for seed dispersal. Pupils will learn that germination is the process where a seed begins to grow into a plant, building on knowledge from Year 1 and 2.	The unit then progresses on to studying the three groups that geologists sort rocks into; sedimentary, igneous and metamorphic. Studying the ways in which rocks can form helps pupils to recognise the difference between rocks, the properties they have and to further understand the landscapes on earth. One of the properties pupils will study closely is permeability. They will recognise that understanding the permeability of a particular rock is useful for geologists to make decisions about what that rock should be used for. This thinking draws on understanding from Year 1 and 2 Materials, where pupils considered the properties of materials and their purpose. Building on their knowledge of sedimentary rock, pupils will learn that due to the process of its formation, fossils are most often found in sedimentary rock layers. Pupils will learn that palaeontologists are scientists who study fossils. They will be introduced to the process of fossilisation and will understand that fossils are a record of things that lived on earth many thousands or millions of years ago. They will look closely, where possible, at fossil samples, or images of fossils including those of plants. Finally, pupils will build on their understanding of	In the second lesson, pupils will learn about the force of friction. They will compare how things move on different surfaces by investigating how a toy car moves down a ramp. They will select different materials to place on the ramp to see how it affects the car's ability to move down the ramp. They will learn that friction is a contact force, where two objects touch, but gravity is a non-contact force as it can act upon an object alone. Moving through the unit, pupils will observe how magnets attract or repel each other and attract some materials and not others. They will compare and group materials on the basis of whether they are attracted to a magnet and will identify magnetic materials. Pupils then learn about the poles of a magnet and will think about whether two magnets will attract or repel each other, depending on which poles are facing. In the final lesson, pupils will work scientifically to test the strength of different magnets. They will learn that generally, larger magnets are stronger than smaller magnets that are made from the same material, however this is not always the case. Pupils will learn that heating a magnet to high temperatures can weaken its magnetic force. They will then test the strength of the magnets they have in the
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					different rock types and will look closely at the composition of different soils. Ideally with real samples, children will use microscopes and magnifying glasses to look at soil and find out what it is made from. They will learn that scientists use the term 'organic matter' to mean a substance made up of decaying plants, animals and insects. Noticing any small rocks within the soil sample, the pupils will be able to describe the samples and compare them, recognising that like rocks, soils can be different. Finally, pupils will complete an essay (extended piece of writing) to answer this question: What can rocks tell a geologist about our planet? This will give pupils an opportunity to reflect on each lesson of this unit and create a piece of coherent scientific writing that may include labelled diagrams.	classroom and record their findings. Finally, there are some short assessment tasks suggested and an optional extended writing task that requires pupils to explain what they know about forces and magnets.
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	Autumn 1 - The Human Body	Autumn 2 - Classification of Plants and Animals	Spring 1 - Ecology	Spring 2 - Sound	Summer 1 - States of matter - The water cycles	Summer 2 - Electricity
Year 4	Lessons: • Cells and nutrients • Our teeth and their functions • Digestion • A healthy diet • Vitamins and minerals Using prior knowledge as a springboard to understand, children will return to the knowledge that some aspects of life on earth are too small to see. They will learn that we cannot see the building blocks of life, cells, without a microscope. Importantly, children will learn that cells make up tissue (e.g. muscle), which make up organs, which function in systems within our Bodies. Building on their knowledge of digestion, children will learn that food is broken down into small parts so that the nutrients can be absorbed into our cells. Returning to prior knowledge children will look again at human teeth. They will understand that most humans are omnivores, which means eating a mixed diet of plants and meat, and our teeth are shaped to accommodate such a diet. Crucial processes such as saliva production, chewing, production	Lessons: • Introduction to classification • Classes of vertebrates: Fish and Amphibians • Classes of vertebrates: Reptiles, Birds and Mammals • Classes of invertebrates: Insects, Arachnids and Molluscs • Classification of plants In this unit the children will look closely at the concept of classification in relation to vertebrates, invertebrates and plants. Children will learn about Carl Linnaeus and his work to name and classify living things. Children will ask and answer questions about fish, amphibians, reptiles, birds, mammals, insects, arachnids and molluscs. Children will look closely and observe how these living things are structured, what their features are and how they compare and contrast with other animals. They will also study flowering and non-flowering plants and differences in the reproduction of these living things. Conceptually, children are building their understanding of	Lessons: • Living things and Habitats • Natural Cycles • Web of Living Things • Human Threats to the Environment • Ecology in our Local Area Pupils will learn about the seven things that all living things have in common; movement, sensitivity, respiration, nutrition, excretion, respiration and growth. This content is not essential to cover the national curriculum, but being introduced to the concepts here will help children to prepare for upper KS2 and beyond. Pupils will study food chains and will look at what happens when a food chain is disrupted. They will learn that ecosystems are complex webs of life, with many things dependent on one another. They will understand how humans can impact both positively and negatively on ecosystems. In Lesson 4, pupils look at air pollution as an example of how human actions impact the environment. They will learn how air pollution can impact upon ecosystems and how dangerous it can be for	Lessons: • Botany and Flowering Plants • Requirements for life and growth • Water transportation in plants • Pollination in Flowering Plants • Seed Dispersal In this unit pupils will learn that sound is caused by a fast back-and-forth movement: a vibration. A vibrating object will make the particles of air around it vibrate too. The air particles, pushed one way push their neighbours in the same way, and then bounce back, so the vibration spreads outwards. This vibration spreading outwards is what we call sound. How far away you can hear a sound depends on its volume. This is to do with the amplitude (size) of the vibration. A quiet sound, like a whisper, doesn't travel very far. But a really loud sound can travel for hundreds of miles. Pupils will learn that more than a hundred years ago when a volcano exploded on the island of Krakatoa, the sound could be heard in Australia, almost three thousand miles away. This will link to their knowledge of world geography.	Lessons: • Sorting rocks. • How Rocks are Formed • Permeability • Fossils • Soil In this unit, children will learn about the main parts of the Water Cycle including evaporation, condensation, precipitation and collection. They will learn about each part in detail before piecing them all together to complete the cycle. This approach will support their vocabulary development over time, focussing on each scientific process before stepping back and seeing the cycle as a whole. Later, in Year 5, children will build on the substantive knowledge from this unit and will deepen their understanding of meteorology: the study of the weather. They will focus on weather, climate, atmosphere and forecasting before exploring how climate effects people's lives later in the curriculum in Geography when studying Africa and British Geographical Issues.	Lessons: • Electrical Safety • Parts of a circuit • Switches • Thomas Edison and Lewis Latimer • Investigating Conductive and Non-Conductive materials. This unit reconnects to previous learning about electricity, what we use it for, how it behaves and how we must use it safely. Pupils will identify common appliances that run on electricity. They will then move on to looking again at circuits. They will understand that electricity can flow around a loop, called a circuit. They will make simple circuits and consider what happens when the circuit is broken. They will recognise that batteries are stores of electrical energy that can power a component such as a bulb. Pupils will be introduced to switches. They will learn that often a circuit will contain a switch, which allows the flow of electrical current to be stopped by opening the circuit. They will understand that switches can be

	of digestive enzymes and gastric acid will be studied. They will learn that the small and large intestines absorb nutrients from food and that waste is passed out as faeces. Children will then study a healthy diet and the importance of vitamins and minerals. In this unit, knowledge of the importance of dental hygiene and avoiding sugary or acidic foods for general dental health will also be taught. In this unit, children will begin to understand that there is a world of science around us that we cannot see. They will begin to understand that scientists look beyond the immediately visible to learn more about the world we live in.	how and why scientists classify and how taxonomies help us to understand the world around us. This knowledge will be built upon further in Year 6 when children look again at the work of Linnaeus and the Latin names he assigned the living things he studied. This area of the curriculum will link to children's understanding of the work of Charles Darwin and Alfred Wallace who they will also study in Year 6.	many living things. At the end of this unit, there is a lesson designed to include a local study incorporating a local ecological issue or project such as a nature reserve. This will help pupils to see science in action and will encourage them to reflect on how human actions impact their own local area.	Pupils will learn that when you sing a high note, your vocal cords vibrate very fast, hundreds of times a second. We call this a high frequency sound and we hear it as high pitch. When you sing a low note, your vocal cords vibrate more slowly. Lower frequency vibrations make a sound with a lower pitch. This will link to their learning in Music. Pupils will work scientifically by investigating the different sounds made by vibrations using a range of objects including musical instruments. They will ask and answer questions and explain what they find out using scientific writing and diagrams.	Within this unit, pupils first reconnect to their prior learning about states of matter. Using the example of water, they consider its different forms, as a solid, liquid and gas. They will learn that When you boil water in a kettle, it turns to a gas called steam, which is invisible. When steam moves away from the kettle where it had reached boiling point, it condenses into water vapour, which we can see. They will work scientifically to monitor the temperature of melting ice. Later in the unit, children focus upon another process within the water cycle, condensation. They will learn this is the reverse of evaporation. Condensation occurs when water vapour within the air changes state, it cools and becomes liquid water. Within a cloud, water droplets become too large for the cloud to hold and gravity brings the water back down to the surface of the earth as precipitation, often this takes the form of rain. This builds on understanding of gravity from Year 3, Forces and Magnets. They will work scientifically to observe condensation appearing on the side of a cold drink can. After learning about evaporation and condensation, children will learn about precipitation. They will learn about clouds, building on knowledge from Year 1 and will learn that certain types of	used for safety reasons and that a switch opens and closes a circuit which turns any components within the circuit on and off. They will use and apply this knowledge again in Year 6 when they are designing an electrical toy. Within this unit, children will learn about the inventor Thomas Edison and his work. They will learn that he was able to make an electric lightbulb that was suitable for people to use in their homes. They will also learn about Lewis Howard Latimer, an inventor who created a carbon filament for Edison's bulb, which allowed it to shine for long periods of time. This unit emphasises the disciplinary knowledge that children are learning throughout the Primary Knowledge Curriculum, that scientists build on each other's work, learning all they can about what has been thought and said in their field, before thinking beyond that and suggesting new ways of doing things. Thomas Edison didn't just invent the lightbulb one day, he built on other designs of electric lightbulb, tried and tested many different ways to create light, and then produced his lightbulb. Latimer did the same, working on his own ideas, and the ideas of others, to contribute an invention of a carbon filament
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					clouds bring rainfall. In Lesson 5 children will piece together all of their understanding and look at the water cycle as a whole. They will learn that collection is a part of the cycle, and will learn that water collects in rivers, lakes, in areas of vegetation and also seeps into the ground through soil and permeable rock, drawing upon knowledge from Year 3 Rocks). Finally, children are expected to plan and complete a piece of extended writing (essay) explaining how water changes state within the water cycle. This task requires children to show their understanding of the processes that occur within the water cycle and how water changes state.	that allowed Edison's bulb to be improved, to shine for longer than a few days. Finally children will look at conductors and insulators. They will work scientifically to identify which materials conduct electricity, making predictions and testing to find answers. The knowledge from this unit will be revisited and built upon in Year 6 when children study Electricity again. Their knowledge will progress as they explore the relationship between the brightness of a bulb and the number of batteries used in the circuit.
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	Autumn 1 - The Human Body	Autumn 2 - Materials	Spring 1 - Living Things	Spring 2 - Forces	Summer 1 - Astronomy	Summer 2 - Meteorology
Year 5	Lessons: - Human Growth Stages - Adolescence and Puberty - Slowing Down - Growth in Humans and Animals - Preparation for Assessment (research and scientific drawing) In this unit, children will study how the human body changes from birth to old age. In this unit, building on their knowledge of how our bodies work and how we care for them, pupils will study the changes that happen to the human body from conception through to old age. They will cover the period of growth known as adolescence and will learn about the changes to the human body including muscles and bones growing larger, the growth of hair in armpits and around genitals, menstruation and voices breaking. This substantive knowledge will support their understanding of changes within their own bodies, and will enable them to understand and support their peers. Pupils will compare and contrast the different gestational periods of animals, including humans and will understand that human infants need care and attention for many years before they are independent. They will consider	Lessons: - Properties of materials - Which material is best? - Solubility- which materials are most soluble/what solubility means - Separating mixtures - sieving, filtering, evaporating - Reversible changes - dissolving, mixing, change of state This unit builds on prior knowledge from Key Stage One where children began to learn about materials and their properties. Children began to think about how the properties of materials link to their uses. The National Curriculum requires children to have a good understanding of the properties of materials, how some materials can dissolve into a liquid and how this process can be reversed to recover a substance from a solution. It also requires knowledge of separation methods, including filtering, sieving and evaporating. Understanding these processes requires both taught content and also hands-on science work where children can predict, observe and conclude from what they see happening. Where possible, with the materials you have available, add to the plans to offer practical opportunities for children to apply	Lessons: - Life cycles of plants and animals in our local area. - Reproduction in Plants - Life cycles of Mammals and Amphibians - Life cycles of insects and birds - The work of David Attenborough and Jane Goodall In this unit children will learn that light is an energy that enables us to see, and interact with, the world around us. They will learn there are many different sources of light and the light of the sun is vital for life on earth. Children will work scientifically to find out if materials are transparent or opaque using torches. They will learn that light travels in straight lines and sometimes bounces off from an object or material and that scientists call this reflection. There are frequent opportunities for observing and investigating how light behaves and how materials interact with light during this unit. Going beyond the requirements of the National Curriculum at this stage, children will have the opportunity to investigate mirrors and how light reflects from plane, concave and convex mirrors. Working scientifically, children will plan and undertake an investigation to answer the	Lessons: - Forces including gravity - Air resistance, water resistance and friction - Guided investigation: Paper Drop - Guided investigation: Paper Drop - Pulleys, gears and levers In this unit, pupils will look more closely at flowering plants, their features and the functions of their features. They will look at specific species including hydrangea and cacti and there is scope for including flowering plants that grow in the local area if relevant. Pupils will learn that the scientific study of plants is called botany and that what we understand about plants comes from contributions from many botanists over the years (disciplinary knowledge). In the first lesson, children will learn about Joseph Banks, the famous botanist who gathered over 30,000 plant specimens on his travels around the world with Captain Cook and Agnes Arber, who was one of the first women to be recognised for her contribution to botany. The reason we have started this unit with looking at botanists, is to show children real scientists study plants, they look closely at plant specimens, draw and annotate	Lessons: - The Big Bang and the expanding universe. - Gravity - Our Solar System - The Moon - Our Galactic neighbourhood In this unit, children will study astronomy. They will learn that the word astronomy comes from the Greek word astron meaning 'star'. Therefore, astronomy is the science that studies the laws of the stars and everything in the universe beyond the Earth's atmosphere. The substantive concepts of this unit are motion, force, energy, matter and space. In this unit, the children will learn about the evolution of the universe, gravity, the solar system, lunar phases and about galaxies. In Lesson 1 of this unit, children will learn that the universe contains everything in existence, including all the energy and matter that there is. They will learn that the universe is in motion, constantly expanding, which is what led astronomers, scientists who study outer space, to theorise how the universe began: The Big Bang Theory. In Lesson 2, children will learn that gravity is a force that holds objects together, the bigger the	Lessons: - Meteorology and the Atmosphere - The Ozone Layer - Air Movement - Cold and Warm Fronts - Thunder and Lightning In this unit, children will deepen their understanding of meteorology: the study of the weather. Building on the children's existing schemas, the substantive concepts of this unit will focus on weather, climate, atmosphere and forecast. The disciplinary knowledge gained in this unit allows the children to think more like meteorologists, using data and diagrams to deduce and draw logical conclusions. The study of meteorology is connected to many elements of science, maths and technology. In 340 BCE, Aristotle (Greek philosopher), wrote the first major study into the Earth's atmosphere. However, many of his ideas were discredited because he did not believe it was necessary to make scientific observations. In the 1920s, Vilhelm Bjerknes, and other Norwegian meteorologists, developed the concepts of air masses after discovering how warm and cold air masses move and meet in patterns; this discovery was the

growth stages and the features of these for animals and humans. Recognising that all living things have growth stages is important scientific knowledge that will support fundamental understanding of biology as children move through the KS2 curriculum and beyond. Pupils will learn about changes to the human body in old age and the importance of a healthy lifestyle at all ages. This content must be taught with sensitivity towards any children that may have suffered a bereavement. It is important that children understand that even with the healthiest of lifestyles, the ageing process cannot be stopped altogether. Pupils will undertake research to complete an extended piece of writing to describe the main stages of human growth; from conception to old age. A lesson is dedicated to preparing for this extended piece of writing to allow pupils to gather data, present it in tables or create diagrams to enhance their writing. The content of this unit will be built upon in Year 6 when children study reproduction in plants, animals and humans.	what they have learned. In this unit children will revisit the concept of conductivity. They will look at the most suitable material for thermal conductivity and will analyse different materials and their properties. After revisiting this knowledge, children will move on to studying solubility; which materials are soluble and what it means to be soluble. This knowledge and understanding will form a foundation of understanding of chemistry that they will build on in KS3. Children will then take their science learning further to look at separating mixtures through sieving, filtering and evaporating. They will work scientifically to separate a mixture using a range of tools and methods. They will learn about the scientist Jabir ibn Hayyan, who is thought to have invented a crucial tool for the distillation process; the alembic still. Reversible and irreversible changes will be studied as children deepen their understanding of dissolving, mixing and changing state.	question, 'Do shadows stay the same throughout the day?' Planning this investigation will require children to think about the best ways to investigate things, how to make sure their investigation is fair, and how to record their findings. Children should understand that the Earth is rotating on an axis, the sun is not orbiting the earth as it may appear from the sun seeming to move across our sky. Children will understand that the sun's position in our sky determines the shape and size of our shadows. Children will see a time-lapse video of a sundial and will learn that this way of measuring time was used thousands of years ago. (Links to Ancient Greece in History) To assess their understanding, there are two options at the end of this unit. The first option requires children to draw a scientific diagram to show how shadows are made before providing a short written explanation. The second is an extended piece of writing, or essay, that answers the question 'Why is light important?' Drawing scientific diagrams and organising writing to explain something will help children to understand how scientists work and communicate their thinking. Alongside the link to History with sundials, this unit also links to Visual Arts in Year 4 where children look at how artists represent shadows in their work.	pictures and diagrams, go into the world to look for plants and vitally ask questions about how plants behave, for example how they reproduce. Therefore, when pupils go on to do some of these things in the subsequent lessons within this unit, they will understand that these tasks require scientific thinking, questioning, exploring and analysing. As pupils work through this unit they will continue to build an understanding of the diversity of life on Earth. In this unit, pupils will learn that although plants all need light and water to thrive, they need it in differing amounts. They will recognise that plants grow in diverse environments around the world and even within a garden, there are some plants better suited to particular places than others. Pupils will go on to focus on how plants transport water from their roots to the rest of the plant. They will see how celery does this by investigating what happens when we place a stick of celery in brightly coloured inky water. This builds on their understanding of what a plant needs. This unit also covers pollination and seed dispersal, two vital parts of the life cycle of a plant. There is an emphasis on interconnection in these lessons, pupils learn how animals such as bees are vital for the pollination process and also, in	objects the bigger the force of gravity. They will learn that the Earth's gravity holds us to the Earth's surface; and the Sun's gravity holds the Earth in orbit around it. In Lesson 3, the children will learn that the Sun is at the centre of our Solar System. They will learn about the planets in our solar systems, including both the terrestrial planets (Mercury, Venus, Earth and Mars), and the Jovian planets (Jupiter, Saturn, Uranus, Neptune). In Lesson 4, the children will learn that the Moon is the Earth's natural satellite. They will also learn about the phases in the moon, and how depending on the position of the Sun, we see all, part or none of the Moon. Finally, in Lesson 5, the children will learn about our galactic neighbourhood, and how our solar system is just a small part of our universe. Overall, this unit builds on the children's substantive knowledge concepts of motion, force, energy, matter and space, which will further be built upon in later secondary schooling.	building block for modern forecasting. The study of meteorology also brought great advances to military operations during World War I and World War II. The accuracy of gun fire and successful deployment of military pilot balloons and military aircrafts largely depended on wind speed, temperature and humidity In our first lesson of this unit, the children will build upon prior knowledge to deepen their understanding of meteorology. In Year 1, the children were introduced to the concept of seasons and daily changes in the weather; they learnt that a meteorologist is a scientist who studies the weather. In this unit, the children will learn that meteorologists have the knowledge and skills to predict forecasts and to explain weather-related phenomenon. They will learn that weather happens because our planet is wrapped in layers of air called the atmosphere. Our second lesson will focus on the ozone layer and how, in 1976, scientists discovered a hole in the ozone layer due to particular chemicals produced through man-made products. The children will learn that a worldwide agreement, called the Montreal Protocol, banned the production of ozone depleting chemicals, in 1987. In our third lesson, the children
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				some instances, for seed dispersal. Pupils will learn that germination is the process where a seed begins to grow into a plant, in this unit is an additional lesson on the American botanist George Washington Carver. Understanding Carver's work will build on knowledge of food and farming and will show children how the work of scientists can influence how people work, what they grow and how they feed their families. Carver was born into slavery; understanding the implications of this for his life will provide some prior knowledge for children when they study the Slave Trade in Year 5. This unit plays a crucial role in helping pupils to understand substantive science knowledge, how plants grow, what they need to thrive, how they reproduce, but also disciplinary knowledge of how scientists construct knowledge within their fields.		will learn that the UK experiences six air masses which affect the weather, and that the UK's climate is called a maritime climate because it is largely influenced by the sea. In lesson four, the children will be introduced to warm and cold weather fronts. Finally, the children will learn how thunder and lightning is caused, and how we often see lightning before hearing thunder. This is because light travels faster than sound. Overall, this unit complements our overarching science curriculum aim, which is to enable children to understand the important role that science plays in the sustainability of life on Earth. And, as their substantive knowledge of concepts such as weather and climate progresses, the children will study how weather and climate affects people's lives.
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	Autumn 1 - The Human Body	Autumn 2 - Classification of Living Things	Spring 1 - Electricity	Spring 2 - Light	Summer 1 - Reproduction	Summer 2 - Evolution
Year 6	Lessons: • The Heart: Circulation of the Blood • Blood Vessels and Transport • Components of Human Blood • Blood Pressure and Heart Rate • Heart Rate- an Investigation During this unit children will build on their knowledge of the circulatory system. They will learn that William Harvey was a doctor who suggested the heart was at the centre of a circulatory system that moved blood around the body. They will learn that now; scientists and doctors know that the heart and blood vessels are parts of our circulatory system and that our circulatory and respiratory systems keep us alive. We know that our heart is divided into four chambers and blood enters and exits the heart. As the heart beats, it pumps the blood out to the lungs for a new supply of oxygen. Blood vessels, called arteries, carry oxygen- rich blood away from the heart. Blood vessels, called veins, carry blood back to your heart to be pumped to the lungs for more oxygen.	Lessons: • Classifying organisms • Cells: Plant and Animal cells • Taxonomy • Vertebrates • Invertebrates Building on prior knowledge of classification children will look further at the work of Carl Linnaeus and how he classified plants and animals. They will look at further subdivisions of groups such as classifying invertebrates into insects, arachnids, molluscs etc. They will discuss why particular living things are sorted into one group and not another. Children will learn that plant and animal cells are structured differently and that plant cells contain chlorophyll, vital for the process of photosynthesis. Children will learn that organisms are divided into kingdoms, phylum, class, order, family, genus, species and that all organisms have a scientific name made of the genus and species e.g. Dog = Canis Familiaris, Human = Homo Sapiens. In this unit children will build on their knowledge of invertebrates studying insects, arachnids	Lessons: • Simple Series Circuits • Buzzers and lamos • Switches • Planning an investigation • Investigation In previous years, children have worked scientifically to make simple circuits and to investigate how electricity behaves within a circuit. Children will have experienced using batteries, wires and bulbs. They will build on their learning in this unit, recapping that electricity carried energy that can be converted into heat, light and energy in our homes, schools and places of work. Children will develop this knowledge to understand that electricity can only travel if there is a complete circuit. In this unit, children will use symbols to represent components of a circuit including batteries, wires, bulbs and switches. Children will learn about the importance of switches for conserving energy and for safety reasons. Children will build their understanding of batteries and their voltage. They will make the	Lessons: • How light travels • How we see • Shadows and their shape • The Colour of Light • Making a periscope In this unit pupils will look more closely at light and how it behaves. They will learn that light is the visible part of a spectrum of energy. Pupils will be reminded that some surfaces reflect light, some allow it to pass through them and some block it. They will look again at shadows and how light travels. Pupils will test the hypothesis that shadows are always the same shape as the object that made them. They will work scientifically to plan how to test the hypothesis, before carrying it out. Pupils will also look at how the eye functions, how light travels through it and how our brain receives messages from the eye. Going beyond the national curriculum requirements, pupils will also look at prisms and how they split white light into its constituent colours. This will give pupils some prior	Lessons: • Asexual reproduction • Sexual reproduction in non-flowering plants • Sexual reproduction in flowering plants • Reproduction in animals • Growth stages This unit covers content which is additional to the National Curriculum. It builds on understanding of how plants and animals reproduce from previous years. This unit begins with a practical task to set up an investigation into asexual reproduction in plants. Pupils will observe a potato, ginger and garlic over the course of this unit to look for growth. Pupils will learn that some plants reproduce asexually, not requiring a male and female, but reproducing by copying itself. Understanding this form of reproduction will build on knowledge of how flowering plants reproduce. In the second lesson, pupils will dissect a flower, reinforcing knowledge of flowering plants and their reproductive organs. They will work scientifically to identify, remove and observe the sepal, stamen, pistil and	Lessons: • Fossils and Evolution • Inheritance • Adaptation • Charles Darwin • Alfred Wallace In this unit, children will be introduced to the concept of evolution: the process by which living organisms (plants and mammals) develop and change, over time. The substantive concepts of this unit are inheritance, variation, adaptation and evolution by natural selection. Declarative knowledge (knowledge which manifests from the central principle), such as knowledge of biomes, habitats and reproduction, will also be built upon in this unit. The disciplinary knowledge gained in this unit will allow the children to think more like palaeontologists, naturalists, biologist and anthropologists (all types of scientists), by using data and diagrams to deduce and draw logical conclusions. The study of evolution is complex and it is connected to many elements of science, geography and history.

	Children will learn the importance of each part of the circulatory system including arteries, veins and capillaries. Building on the understanding that some parts of our body are too small to see, children will learn that blood is made up of different components. They will learn that the main liquid in our blood is called plasma. Red blood cells contain a substance called haemoglobin which carries the oxygen and carbon dioxide. White blood cells attack and destroy bacteria. Platelets are responsible for clotting the blood. Children will learn about the important role the lungs play in oxygenating blood, a process that is vital for life. When working scientifically, children will conduct an investigation to find out how exercise effects pulse rate. They will think about variables and control variables whilst planning the best way to find an answer to their question. They will then complete their investigation and analyse the results.	and molluscs. They will also learn about cnidaria, invertebrates that live in a marine or freshwater environment such as jellyfish, sea anemones and coral. The knowledge in this unit will prepare children for understanding Biology at KS3 when they study the structure and function of living organisms and genetics and evolution.	link between Alessandro Volta and his interactions with Napoleon Bonaparte. They will learn that adding more batteries to a circuit can increase the brightness of a bulb. In this unit children will design, make and evaluate an electrical device. They will design a device for a purpose, which can be set by the teacher. They will work scientifically to consider the purpose for which they are designing their device and what it must be capable of. They will make their device using simple materials such as wires, batteries, buzzers and switches. They will create labelled diagrams when planning their design, using symbols. At the end of the unit they will apply their knowledge to design an intruder alarm.	knowledge when they come to study the different frequencies of light and prisms in KS3 Physics.	pollen. In the third lesson, pupils will continue to work scientifically as they dissect fruit looking for three parts of the fruit; the exocarp (skin), mesocarp (flesh) and endocarp (seed covering). They will build on their understanding of seed dispersal and will learn that the fruit is an important part of reproduction for many plants. Moving on to reproduction in animals, pupils will look again at how animals reproduce, building on their knowledge from previous years. They will learn about internal and external fertilisation and will understand that different animals reproduce in different ways. They will learn that external fertilisation has a much higher mortality rate, therefore animals that use external fertilisation, e.g. fish, produce many more young than those who use internal fertilisation e.g. humans. Pupils will build on this knowledge and look at growth stages of animals, building on their knowledge from Year 5 when they studied human and elephant gestation periods. Pupils will learn that animals care for their young in different ways and that offspring vary hugely in their ability to be independent when they are born. This unit has been included to	In this unit, children first understand that fossils are evidence of evolution (a change over time), then ensuring the children understand the concepts of inheritance and adaptation, before progressing onto teaching the concept of evolution by natural selection. Cognitive science tells us that starting with concrete understanding will help support more abstract concepts. In our first lesson, the children will build upon prior knowledge of rocks and fossils to deepen their understanding of how fossils provide evidence for evolution. Misconceptions are addressed, such as the understanding that most life on Earth does not become fossilised. Children will be shown images of the different fossil types, and utilising their vocabulary, they will outline how each fossil type is helpful for palaeontologists (a scientist who studies fossils), and how this data is used to support the theory of evolution, building on their disciplinary knowledge. In lesson 2, children will learn that inheritance is the process of passing on characteristics from a parent to their offspring, and how there are various combinations of characteristics, resulting in variation, which explains why we may look similar to our parents
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					deepen understanding of reproduction in plants and animals and to give pupils a clearer picture of some of the similarities and differences in the world of living things.	or siblings but not identical (unless you are an identical twin). The children will learn that evolution is the change in inherited traits. In our third lesson, we will explore adaptation. In this lesson, children will marry together their previous knowledge of biomes and habitats (from many of our previous Geography units). They will be shown images of different animals and will be asked to consider their natural habitat and what challenges these animals may face; and, therefore, what adaptations have been made, and perhaps what adaptations will be made in the future. Again, this activity will link back to developing the children's disciplinary knowledge. The children will learn that adaptation plays an important part in evolution as species change over time. In lesson 4, the children will be introduced to history's most famous biologist Charles Darwin. They will learn that Darwin spent years observing, comparing and analysing many specimens of plants and animals before he developed his theory of natural selection and evolution. In particular, the lesson focuses on Darwin's observations of Finches. The children will be asked to analyse images of Finches and think about what adaptations have
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						been made, and why this bird may have evolved in this particular way in different locations. The lesson ends with the children thinking about the phrase, 'survival of the fittest' and what this might mean in the context of evolution. Finally, in lesson 5, the children will be introduced to Alfred Wallace, another scientist who also developed the theory of evolution during the same period as Charles Darwin. Wallace found that several birds, mammals and fish species are found in abundance in one location and only in small numbers, or not at all, in another. Overall, this unit complements our overarching science curriculum aim, which is to enable children to understand the important role that science plays in the sustainability of life on Earth. This unit lays the foundation of the children's substantive knowledge concepts of inheritance, variation, adaptation and evolution by natural selection, which will be built upon in later secondary schooling.
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