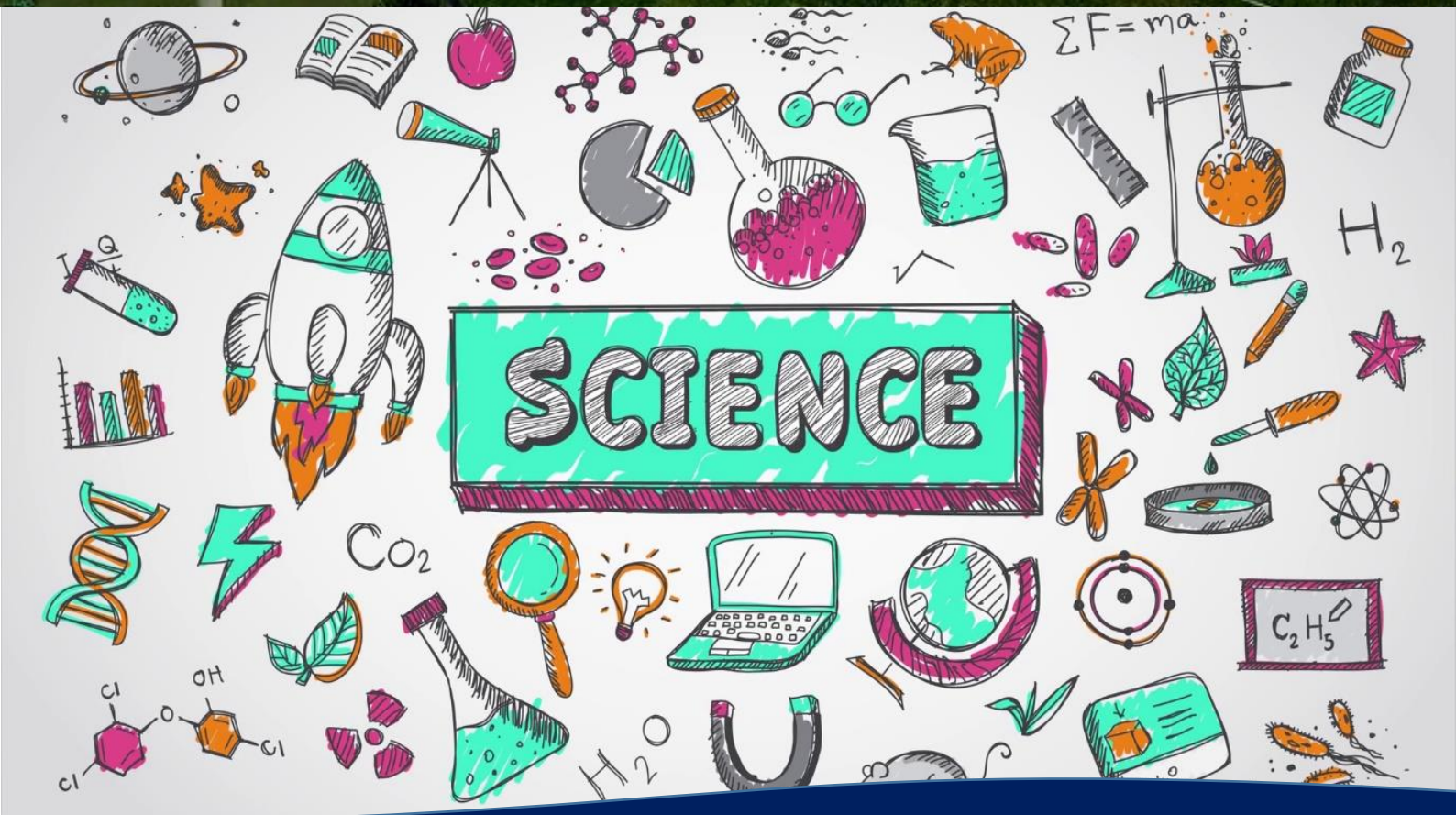
# St Helen's CE Primary School




# History Curriculum

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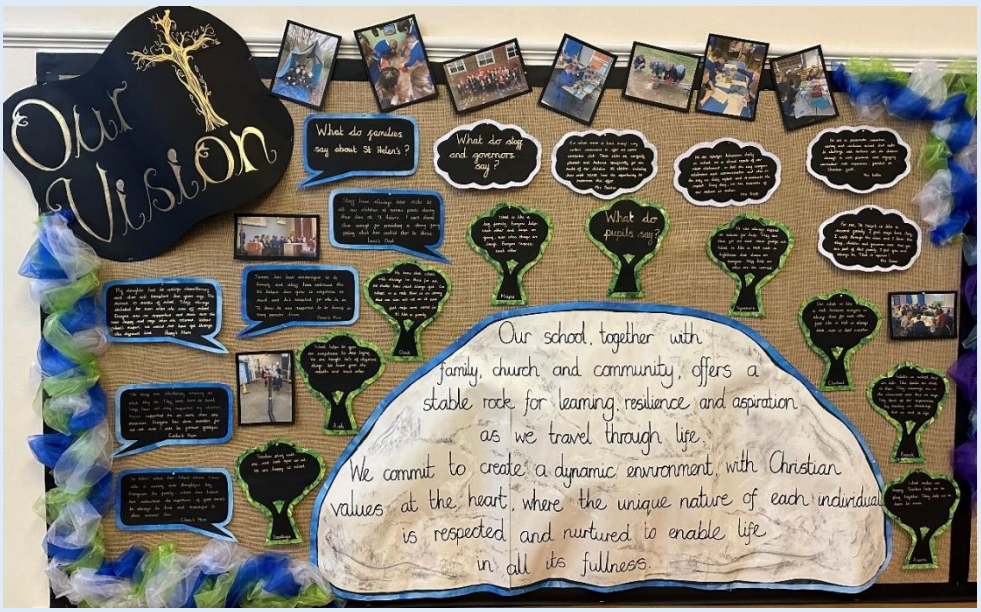
# School Vision & Values

**Our school, together with family, church and community, offers a stable rock for learning, resilience and aspiration as we travel through life.**

**We commit to create a dynamic environment, with Christian values at the heart, where the unique nature of each individual is respected and nurtured to enable life in all its fullness.**

***"The rain came down, the streams rose, and the winds blew and beat against that house; yet it did not fall, because it had its foundation on the rock." Matthew 7: 25-27***




**At St Helen's Church of England Primary School, our Christian Values can be found in all that we do and are shared and discussed regularly through worship, lessons and around the school. They are the foundation to Jesus' teaching and here at St Helen's we believe that they underpin the creation of well-rounded pupils. The Christian Values derived from a comprehensive stakeholder consultation.**


**Our curriculum has been designed with our vision and values at the centre. Every decision in school comes back to us living out our Christian Vision and Values.**

# Rationale & Intent

**At St Helen's, science is taught discretely with a focus on both substantive and disciplinary knowledge to ensure full coverage of the curriculum which is both progressional and engaging to pupils. Our science curriculum has been designed with the belief that science provides the foundations for the understanding of the world and has been mapped out in order to meet the objectives guided by the National Curriculum for Science (2014):**

- **develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics**
- **develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them**
- **are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.**

**To develop both substantive and disciplinary knowledge, which will equip them for future careers, children take on the role of scientists which encourages a sense of curiosity and excitement about the natural world. To do this, we believe science should be delivered in a creative, active ways which allow children take ownership over their learning and provide wider links to other subjects within the curriculum. We also believe that science shouldn't stop inside the classroom therefore children are encouraged to 'think like scientists' all around the school by providing children with opportunities for awe and wonder.**

**At St Helen's, the planning of learning always takes place with both substantive and disciplinary knowledge of which the delivery is planned using a range of up-to-date resources and activities which allow children to develop as independent learners. Teachers are encouraged to develop their own subject knowledge surrounding each topic to ensure high quality delivery of learning. As a school, we take into account any context specific issues that we can meet through science. An example of this is dental hygiene, which is planned into each year group as an additional focus.**

**During lessons, children are exposed to high quality scientific vocabulary which is linked through all areas of the curriculum and includes the vocabulary required to work scientifically.**

# Progression Overview

**Biology**

In Nursery, children begin their biological understanding through exciting and engaging first hand experiences such as observing first-hand the life cycle of a butterfly. High quality texts allow children to immerse themselves in the basic ideas of being healthy and by Reception, children are aware of the importance of physical exercise. Reception children continue to be surrounded by thoughtful first-hand experiences such as growing chicks. These experiences expand their knowledge of life cycles and develop their observational skills.

In Reception, children are encouraged to take an interest in the world around them, observing and asking questions in their Understanding the World area. They grow plants, observe the weather and seasonal patterns and look after minibeasts and animals such as chickens, watching them grow and change. This establishes the groundwork for children in Year 1 and Year 2 who learn to use simple equipment to observe and being to record their observations in different ways. They are beginning to ask questions and to perform simple tests to find out more for themselves. Pupils know that they are animals too, finding out what animals, including themselves, need to keep healthy. Children in Key Stage 1 learn that animals and plants are grouped by scientists according to their properties and characteristics. They know that different creatures live in different habitats to which they are uniquely adapted.

The children in Year 3 build on this knowledge with their work on Skeletons and Muscles, learning in more detail about the nutrition that they need and learn about food groups. The work on plants is continued by the further, more detailed study of the functions for different parts of flowering plants and experimentation to explore the requirements of plants for life and growth. Year 4 continue to develop the work started in Year 3 with a detailed study of teeth and digestion, understanding the process by which nutrients are extracted from food, comparing different animals' diets, teeth and digestive systems. They understand food chains and the predator/prey relationship.

In Year 5, children look at the lifecycles of different classes of animals, directly observing the lifecycles of plants and animals in their environment as well as those further afield. The work on plants is further developed by learning about sexual and asexual reproduction, taking cuttings and planting seeds. The pupils consider the development and growth of plants and animals, using their previous knowledge about what animals and plants need to fully grow and develop their potential.

Year 6 refine their knowledge of the properties of plants and animals by studying the classification of living things, learning some of the subdivisions that are used. They use direct observations and begin to reason why some groupings and not others are used. Pupils use their knowledge of classification to identify animals and plants in their locality. Further extension of the work on the human organs takes place with a study of the circulatory system, understanding how the circulatory system enables the body to work. They learn how that bodies can be damaged by incorrect nutrition, by the use of recreational drugs and substances such as tobacco and alcohol.

# Progression Overview

## Physics

In Nursery, children start their understanding of physics by engaging in child-led investigations and purposeful problem-solving activities within their surrounding provision. They have endless opportunities to learn about balance and by Reception, children are ready to think more thoroughly about materials.

By Year 1, children are then ready to name and explore the properties of a number of everyday materials with which they are already familiar. Simple testing and a variety of ways of recording their findings allow the children to describe, compare and group materials according to their simple physical properties. This work is further developed in Year 2 when the suitability of materials for different uses is explored and tested. Children identify and classify materials and test how they can change the shape of some materials.

Year 3 further explore the properties of materials, specifically looking at magnetism and the forces that magnets exert. The study of light gives Year 3 children the opportunity to experiment with shadows and to learn how light travels. Year 4 continue this exploration of movement by waves and fields by studying electricity, learning to construct simple circuits, observing carefully and working safely. The study of sound in Year 4 gives the opportunity to explore the way in which sounds travel by vibration and children work as scientists by experimentation with changing pitch and volume.

Work in Year 5 considers Space, looking at the ways in which planets move in relation to one another and the effect of the various gravitational forces of different bodies, such as the moon has on the tides on Earth. The study of Forces is revisited with work on friction, gravity, air and water resistance and magnetism. Topics studied in Lower Key Stage 2 are further enhanced at Year 6. Work on electricity is expanded to include series circuits, observing the effects of adding and changing components and designing and making useful circuits. Work from Year 3 is built on in the study of Light by exploring the way in which light behaves and how this affects how things are made.

## Chemistry

Children in Nursery begin to make observations about the melting of ice which linked to first-hand observations. This is extended in Reception where children explore freezing and melting of a variety of different substances. The study of rocks in Year 3 introduces children to the idea that rocks have been formed by various processes, and may include minerals, crystals or fossils, and that they can change over time. They observed and explore similarities and differences between rocks. In Year 4 children also expand their Materials knowledge from KS1 by learning about states of matter and ways in which materials can change state, exploring and describing their observations in the context of the water cycle. This work develops further through the Year 5 topic of Changing Materials which looks at reversible and irreversible changes and gives the children the opportunity for experimentation, learning to work accurately and carefully, recording their results precisely.

# Long Term Plan

| Year Group | Autumn Term | | Spring Term | | Summer Term | |
|---|---|---|---|---|---|---|
| Nursery | Exploring the school grounds | Natural materials & Senses | Collection of materials | Planting seeds | Feeling forces | Animals |
| Reception | Natural world | Senses & The School Environment | Introduction to Seasons | Floating & Sinking | Different Environments | Animals & Life-Cycles |
| Year 1 | Humans | Seasonal Changes | Animals including Humans | Materials Part 1 | Plants | Materials Part 2 |
| Year 2 | Animals including Humans | Living Things & their Habitats | Materials | | Plants | Life-Cycles |
| Year 3 | Light | | Rocks & Soils | Forces & Magnets | Plants | Animals including Humans |
| Year 4 | Animals including Humans | Sound | Electricity | States of Matter | Living Things & their Habitats | |
| Year 5 | Changing States | | Forces | Life Processes | Space | Animals including Humans |
| Year 6 | Electricity | Light | Forces | Classification | Animals including Humans | Evolution |

# Unit Overviews

## Nursery

| | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
|---|---|---|---|---|---|---|
| **Overview** | Children will begin to explore the school environment, with a particular focus on their immediate outdoor environment. | Children will begin to use their senses for hands-on exploration of natural materials.<br><br>Children will begin to discuss that they see/hear/taste/touch/smell | Children will explore collections of materials with similar and/or different properties.<br><br>Children will talk about the differences between materials and changes that they notice. | Children will plant seeds and care for the growing plant.<br><br>They will begin to look at the key features of the life-cycle of a plant. | Children will explore and talk about forces around them that they can feel. | Children will begin to look at the life cycle of an animal and understand that animals start as babies and then grow to adults. |
| | Throughout the year, pupils will begin to explore and learn about the four seasons and weather. | | | | | |
| **Vocabulary** | Outside<br>Inside<br>Look | Look<br>Listen<br>Touch | Sort<br>Rough<br>Smooth | Plant<br>Seed<br>Grow | Bend<br>Break<br>Stretch | Grow<br>Watch<br>Animal |

## Reception

| | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
|---|---|---|---|---|---|---|
| **Overview** | Children will explore the natural world around them. They will visit the forest school area and explore leaves, trees and bushes. | Children will explore the school environment using their senses. They will begin to understand how they use their senses to help them. | Children will explore the seasons in more detail.<br><br>Children will explore shadows. They will learn that, when it is sunny, they can make a shadow of their bodies. | Children will explore objects which float and which sink.<br><br>Children will learn how to care for plants e.g., what they need to grow. | Children will learn how different environments around the world look different. They will think about the reasons for castles being built on hills. They will use images as a starting point for art work. | Children will learn about animals. They will visit Yorkshire Wildlife Park and see animals from all around the world.<br><br>They will see the beginning of the life-cycle of a chicken through a real-life experience. |
| | Throughout the year, pupils will explore and learn about the four seasons and weather. They will learn that winter is cold and that we can get snow and ice and summer is warm. Children will learn the role of the sun. | | | | | |
| **Vocabulary** | Leaf<br>Leaves<br>Trees<br>Bushes<br>Autumn | See<br>Hear<br>Touch<br>Smell<br>Taste | Shadow<br>Light<br>Sun<br>Block<br>Winter | Float<br>Sink<br>Care<br>Weed<br>Spring | Hill<br>Steep<br>Slope<br>Mountain<br>High | Insect<br>Bird<br>Fish<br>Summer<br>Pets |

| Year Group | 1 |
|---|---|
| Question | Are we all the same or are we all different? |
| Theme | Animals including Humans |
| Overview | Children will begin the unit of work by learning that all humans are different. They will understand that all humans are different heights. They will ask questions about differences and record them simply. They will use observations to note similarities and differences. Children will learn and name the basic parts of the body. They will be able to explain what different parts of the body are used for. They will understand that humans are similar in their body parts. Children will observe and identify part of the face. They will learn which parts of the face are used for senses. Children will then learn that different parts of the body are used for different senses. They will learn that eyes are linked with sight, ears with sound, nose with smell, tongue with taste and skin with touch. Children will explore their senses in more detail and ask questions and investigate the answers. They will take part in a variety of sense-based activities |
| Substantive Knowledge | • All humans are different but have the same body parts.<br>• Humans find out about the world through their senses.<br>• Humans see with eyes<br>• Humans hear with their ears<br>• Humans touch with their hands and mouths<br>• Humans smell with their noses<br>• Humans taste with their tongues. |
| Vocabulary | senses, touch, smell, taste, sight, hearing, skeleton |

| Year Group | 1 |
|---|---|
| Questions | Is the weather the same every day? What happens to our trees? |
| Theme | Seasonal Changes |
| Overview | Children will investigate their local environment at different points in the year, taking note of the plants around them and the weather. They will take photographs so that they can compare and contrast how plants look and how the weather was similar or different. Children will learn that there are four seasons. They will learn the typical weather associated with each season. They will keep a weather diary and learn that the weather changes throughout the year, being warmer is summer and colder in winter. |
| Substantive Knowledge | • There are 4 seasons in a year: Summer, Autumn, Winter and Spring.<br>• The weather is usually warmer in summer and the days are longer.<br>• Winter is colder with shorter days.<br>• Summer is warmer with longer days. |
| Vocabulary | seasons, changes, weather, Spring, Summer, Autumn, Winter, night, day, sun |

| Year Group | 1 |
|---|---|
| Question | Are all animals totally different? |
| Theme | Animals including Humans |
| Overview | Children will learn that humans are part of the mammal family. They will learn the names of other mammals and understand what mammals have in common. They will learn that some parts of the body which are specific to animals e.g. hooves for horses. Children will learn that birds are different to other animals in that they have feathers and wings. They will look for birds in the school grounds at different times in the year to see if they see the same or different types of birds. Children will learn that animals can be sorted according to their structures. They will sort animals into different criteria that they have decided. Children will learn that creatures need food to survive. They will learn that animals are with carnivores, herbivores or omnivores and will be able to explain the difference. They will sort animals according to what they eat. |
| Substantive Knowledge | • Animals are divided into 5 classes: fish, amphibians, reptiles, birds and mammals.<br>• Most mammals feed their young milk<br>• Animals need food to survive.<br>• A herbivore eats only plants.<br>• A carnivore eats only animals<br>• An omnivore eats both plants and animals.<br>• Some animals are awake at night and sleep during the day. These animals are nocturnal. |
| Vocabulary | mammal, skeleton, fur, tail, diet, carnivores, herbivores, omnivores |

| Year Group | 1 |
|---|---|
| Question | Are all materials the same? |
| Theme | Everyday Materials |
| Overview | Children will learn different types of materials and be able to distinguish them from each other. They will take a tour around the school looking for different materials, naming them as they see them. Children will begin to give name of the properties of different materials (see key vocabulary). They will learn that some items are made from different materials e.g. a peg is made from plastic/wood because it is hard and a metal spring because it is stretchy and bendy. They will learn that some items can be made from different materials that have the same properties e.g. spoons can be made from plastic, metal or wood. Children will use their knowledge of materials and their properties to create quiz questions that they will test on each other. |
| Substantive Knowledge | • **Glass** is used for …<br>  ○ **Windows** in houses and cars to see through.<br>  ○ **Mirrors** – to see yourself – reflection.<br>• **Metal** is used for …<br>  ○ **Strength** –in construction of planes, cars and trains and especially tall buildings.<br>• **Wood** is used for …<br>  ○ **Doors** – most doors are made from wood.<br>  ○ **Furniture** – most furniture is made of wood, often special wood.<br>• **Plastic** is moulded or shaped …<br>  ○ To form any shape and can be any colour. |
| Vocabulary | hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy/not bendy, transparent<br>Aspirational – opaque |

| Year Group | 1 |
|---|---|
| Question | What plants do we have around us? |
| Theme | Plants |
| Overview | Children will begin the unit by going on a tour of the school grounds. They will have the opportunity to weed, plant and take care of the environment within in the school. They will identify some common plants, including weeds, and have the opportunity to look at roots when pulling them out of the ground. Children will explore the trees in the school grounds and identify an oak, birch and horse chestnut by sight using a tree spotter to help them. They will learn to name some common plants and recognise some of the flowering plants in the school environment. Children will explore planting a bean and keep a diary of how it looks and what happens. They will measure the plant once it starts to grow. Children will be able to identify and recognise a root, stem, petal and leaf. |
| Substantive Knowledge | • Plants have roots, a stem, petals and leaves.<br>• Most plants have green leaves and produce flowers.<br>• Plants can grow from seeds or bulbs.<br>• Some trees keep their leaves all year round. These trees are called evergreen.<br>• Other trees lose their leaves in the autumn. These are called deciduous.<br>• Plants can live in different places |
| Vocabulary | trunk, branch, leaf, root, flower, blossom, petal, root, stem, bulb, deciduous, evergreen |

| Year Group | 2 |
|---|---|
| Question | Is all food good for us? |
| Theme | Plants & Animals including Humans (Healthy Eating) |
| Overview | Children will learn the basic lifecycle of a human. They will be able to explain that we start as babies and change into an adult and explain some of the basic changes. Children will learn that animals have offspring that grow. They will be able to match an animal to its young and explain the changes that an animal may go through. They will learn that once an animal reaches a certain age, it stops growing. Children will learn that animals, including humans, need food, water and air to survive. They will learn what a human needs to be healthy and explain the importance of exercise. Children will learn the importance of eating different types of foods to be healthy. They will begin to recognise foods that are healthy and unhealthy and begin to understand that food is important for growth. |
| Substantive Knowledge | • Humans start as babies and change into an adult as they age.<br>• Animals including humans need water, food and air to survive.<br>• Keeping healthy means caring for your body so you have enough energy to learn, play and grow.<br>• All foods contain nutrients which your body needs to stay active throughout the day. Some foods have more nutrients than others.<br>• Everyone should eat a balanced diet consisting of a variety of foods of all kinds.<br>• Keep your mouth happy by brushing and flossing to have healthy teeth and gums.<br>• It's important to have 30-60 minutes of exercise every day. This can include running around and playing games with friends.<br>• Animals have babies. They may lay eggs, or give birth to live young, like humans do. |
| Vocabulary | lifecycle, offspring, adult, growth, exercise, healthy, unhealthy, diet, survive (survival), hygiene |

| Year Group | 2 |
|---|---|
| Question | Is everything on Earth alive? |
| Theme | Living Things & Life Cycles |
| Overview | Children will begin the unit by recapping their learning from Year 1 on plants, trees and animals. They will be able to give example of animals that are carnivores, herbivores and omnivores. Children will be able to give an example of a mammal, bird, amphibian, fish and reptile. Children will learn that things can be described as living, non-living, dead or never lived. They will begin to learn that living things move, grow, consume nutrients and reproduce, that dead things used to do these things but no longer do and that things that never lived have never done these things. Children will learn about habitats and micro-habitats. They will learn that certain creatures prefer certain habitats according to their needs. They will begin to understand that animals and plants depend on their habitats or micro-habitats for survival. |
| Substantive Knowledge | • Non-living things do not need food, water or air and they cannot reproduce.<br>• Objects that have never been alive were never part of a living thing.<br>• A habitat is a place where an animal lives. It provides the animal with food, water and shelter.<br>• There are many different sorts of habitats around the world from forests to grasslands and from mountain slopes to deserts.<br>• Animals, including insects and plants that live together in a habitat, depend on each other to survive.<br>• Animals get their food from plants and animals.<br>• Because the Earth is always changing, habitats are constantly changing.<br>• Scientists are always finding out more about our planet. |
| Vocabulary | living, non-living, dead, never, habitat, micro-habitat, energy, source, conditions, environment |

| Year Group | 2 |
|---|---|
| Question | What materials could be used to make a good roof for a house? |
| Theme | Use of Everyday Materials |
| Overview | Children will begin the unit with a recap of their learning from Year 1 by naming the materials that objects are made from. They will be able to name properties of different materials. Children will use their knowledge of properties of different materials to explain why materials have been chosen for certain jobs. They will learn that some materials can change shape and be able to describe how this happens. Children will use their knowledge of materials and their properties to test materials for a given purpose. |
| Substantive Knowledge | • Objects are made out of materials.<br>• Different materials are used for different objects, depending on the job that you want that object to do.<br>• Wood is used to make buildings and furniture and for making fires and heating.<br>• Glass is a hard material that can be made in many shapes.<br>• Glass is usually transparent, which means you can see through it, but can also come in different colours.<br>• Plastics are used to make many of the things we use in everyday life. They are used for toys, bicycle helmets, mobile phones, window frames and many other items use plastic.<br>• Materials are chosen according to their suitability for particular jobs.<br>• The shape of materials can be changed by using forces such as squashing and stretching. |
| Vocabulary | flexible, rigid, squashing, bending, twisting, stretching, strength, light, heavy |

| Year Group | 2 |
|---|---|
| Question | Do plants grow the same amount every day? |
| Theme | Plants |
| Overview | Children will learn that plants are part of a lifecycle and that plants start as a bulb or a seed. They will learn about the basic changes that plants go through as they grow and understand the lifecycle of a plant. Children will learn what plants need to grow. They will learn that seeds/bulbs need to be buried underground in soil. Children will investigate the conditions that plants need to grow and stay healthy and be able to explain what they need to others. |
| Substantive Knowledge | • Plants grow from seeds/bulbs<br>• Plants need light, water and warmth to grow and survive<br>• Flowers make seeds to make more plants (reproduce)<br>• Plants are extremely important<br>• We need plants to survive (to clean air, to eat)<br>• We can eat different parts of the plants (leaves, stems, roots, seeds, fruit) |
| Vocabulary | growth, habitat, nutrients, bulb, seed, temperature, warmth, sunlight, shoot, seedling |

| Year Group | 2 |
|---|---|
| Question | Do the creatures living in a habitat change over time? |
| Theme | Living Things & their Habitats |
| Overview | Children will begin the unit by revisiting habitats and micro-habitats and explore different ones in the school grounds. They will learn that animals get their food from plants and other animals. They will learn that animals and plants need food (energy) to survive. Children will use their knowledge to complete a challenge of designing a habitat to enable a certain animal to survive. They will be able to explain what they have chosen and why. |
| Substantive Knowledge | • Non-living things do not need food, water or air and they cannot reproduce.<br>• Objects that have never been alive were never part of a living thing.<br>• A habitat is a place that an animal lives. It provides the animal with food, water and shelter.<br>• There are many different sorts of habitats around the world from forests to grasslands and from mountain slopes to deserts.<br>• Animals, including insects and plants that live together in a habitat, depend on each other to survive.<br>• Animals get their food from plants and animals.<br>• Because the Earth is always changing, habitats are constantly changing.<br>• Scientists are always finding out more about our planet. |
| Vocabulary | living, non-living, dead, food chain, habitat, micro-habitat, energy, source, conditions, environment |

| Year Group | 3 |
|---|---|
| Question | Why do shadows change during the day? |
| Theme | Light |
| Overview | Children will begin to unit by learning what light sources are. They will learn that light sources give off energy and will name both artificial and natural light sources. Children will learn about the main parts of the eye and be able to explain what happens if they were to look at the sun. They will be able to explain ways to protect their eyes from the sun. Children will learn about opaque, transparent and translucent materials and how this links to the amount of light that passes through them. They will conduct an investigation to work out which materials are best for a specific purpose. Children will learn that light is needed to see things and that darkness is the absence of light. They will learn that light is reflected from surfaces and investigate what makes the most reflective surface. Children will learn about how shadows are formed and understand why shadows can change size depending on where the source of light is in relation to the shadow. |
| Substantive Knowledge | • Some light sources are natural and some are artificial.<br>• Our main source of light on Earth comes from the Sun. A ray of light travels very fast.<br>• The Sun and other stars, fires, torches and lamps all make their own light and so are examples of sources of light.<br>• Darkness is made by blocking light from the sun or some other source of light, which makes shadows.<br>• An opaque object does not allow light to pass through it.<br>• A translucent object allows some light to pass through it but not all.<br>• A transparent object allows all light to pass through it.<br>• A mirror is not a source of light it merely reflects light. Similarly, the Moon is not a source of light it reflects the light from the Sun. |
| Vocabulary | light source, natural, artificial, reflect, absence of light, shadow, visible, opaque, transparent, translucent. |

| Year Group | 3 |
|---|---|
| Question | Are all rocks made the same way? |
| Theme | Rocks |
| Overview | Children will learn about the three different types of rocks and how rocks have changed over time, using the term weathering. They will learn about the characteristics and physical properties of rocks and say what is similar and different about them. Children will learn new vocabulary by testing different types of rocks to see how durable, porous and dense they are etc. Children will learn about soil and understand that it is made of organic matter. They will observe and take samples of soil from different areas of school to see if they can see what it is made up of. They will sort and classify soil by discussing its properties. |
| Substantive Knowledge | • Rocks have been used by humans for millions of years, from early tools and weapons through to various construction materials.<br>• Sediment deposited over time, often as layers at the bottom of lakes and oceans, forms sedimentary rocks.<br>• Extreme pressure and heat over time forms metamorphic rocks.<br>• When magma cools and solidifies it forms igneous rock.<br>• Fossils are made when things that have lived are trapped within rock and gradually become crystallised, preserving the shape of the living organism.<br>• Soil is made up of rocks and organic matter. |
| Vocabulary | organic matter, decay, fossil, weathering, permeable, impermeable, sedimentary, igneous, metamorphic, porous, density, durability |

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| Vocabulary | organic matter, decay, fossil, weathering, permeable, impermeable, sedimentary, igneous, metamorphic, porous, density, durability |

| Year Group | 3 |
|---|---|
| Question | Are all metals attracted to magnets? |
| Theme | Forces & Magnets |
| Overview | Children will learn that a force is a push or a pull. They will learn that some forces need contact between two or more objects to act and that some objects need more force to move than others. Children will about friction through an investigation. They learn that different objects move quicker/slower on different surfaces and use appropriate vocabulary to explain how different objects move. Children will learn about magnetic forces and how they can act at a distance. They will learn that magnets have two poles and that magnets can attract or repel each other. Children will learn that not all materials are magnetic and classify materials as magnetic or not magnetic. They will begin to learn about the force of magnetism and say which materials are least likely to be magnetic. Through conducting an investigation, children will learn that some magnets are stronger than others. |
| Substantive Knowledge | • A force is a push or pull on an object.<br>• A force can cause something to speed up, slow down, change shape or change direction.<br>• It is easier to push or pull something along a smooth surface than a bumpy surface.<br>• When two surfaces slide together, a force called friction makes them stick very slightly together. Smooth surfaces have less friction than bumpy surfaces.<br>• The Earth is a very big magnet. Its North and South poles are highly magnetic.<br>• A magnet always has north and south poles.<br>• Magnets only attract certain types of metals, other materials such as glass, plastic and wood aren't attracted. |
| Vocabulary | magnetic, non-magnetic, pole, north, south, friction, elastic, resist, attraction, repulsion |

| Year Group | 3 |
|---|---|
| Question | Do all plans need exactly the same things? |
| Theme | Plants |
| Overview | Children will recap their learning from Year 2 before learning that different parts of plants have one or more functions. They will learn that the roots collect water and minerals from the soil and hold the plant firmly in the ground. Linking to previous learning on rocks and soil, children will investigate different soil types and predict how they think the roots will be able to function correctly and enable the plant to grow. Children will learn about the requirements of plants for life and growth and how these vary from plant to plant. They will learn about the function of a flower and how the flower is vital for reproduction. They will learn about the key parts of a flower and how plants reproduce. |
| Substantive Knowledge | • Flowering plants have roots, a stem/trunk, leaves and flowers.<br>• Plants need air, light, water, nutrients and space to grow.<br>• Plants transport water through a system of tubes inside the plant.<br>• Flowers are very important. This is where pollination occurs and seeds are made.<br>• Many flowers are pollinated by insects but there are also examples of flowers that are pollinated by the wind and by animals. |
| Vocabulary | transportation, nutrients, nutrition, reproduction, seed formation, seed dispersal, pollination, structure, function, germination<br>Aspirational vocab – stamen, style, stigma and ovary, photosynthesis |

| Year Group | 3 |
|---|---|
| Question | How does our body move and stand up? |
| Theme | Animals including Humans |
| Overview | Children will learn about the different basic food groups and what they give to the body. They will learn that animals and humans get nutrition from what they eat and learn about the right about of nutrition that is required for a balanced diet and understand what happens if people don't eat a balanced diet. Children will lean that food have different nutritional values. They will investigate common foods to look at their sugar and fat content and explain their findings. Children will learn that animals, including humans, have a skeleton made up of bones. They will learn the names of some of the bones withing the human body. They will be able to sort animals with different bone structures and know that bones support and protect the body. Children will learn that bones support the body. They will learn that muscles always work in pairs and that joints enable humans and animals to move. |
| Substantive Knowledge | • Animals have skeletons that hold them up and protect the organs inside the body.<br>• Muscles allow the skeleton to move.<br>• It is important to eat the right food for muscles and bones to grow and move.<br>• Food is comprised of carbohydrates, fats, proteins, vitamins and minerals and fibre.<br>• We should not eat lots of food containing too much sugar or fat. |
| Vocabulary | protection, joint, muscles, endoskeleton, exoskeleton, nutrition, vitamins, fat, protein, carbohydrates, fibre |

| Year Group | 4 |
|---|---|
| Question | How can we know things about a dinosaur when they have been extinct for 65 million years? |
| Theme | Animals including Humans |
| Overview | Children will learn about the different types of teeth and their functions. They will learn the importance of looking after their teeth and understand the impact of not doing this. Children will learn that certain foods have a negative effect on their teeth and will conduct an investigation to find out which foods are the worst. Children will learn about the process of digestion. They will learn the different functions of organs within the digestive system and explain that digestion begins with food being chewed in the mouth by the teeth and saliva. They will learn about what happens to the food once swallowed and how the body absorbs the nutrients it needs. |
| Substantive Knowledge | • In the mouth, our teeth and tongue help us to chew food so that it is small enough to swallow safely.<br>• Saliva in the mouth starts the process of digestion.<br>• The oesophagus connects the mouth and the stomach.<br>• The stomach is filled with powerful acids that break down the food into smaller pieces. It also lets us know when we are hungry.<br>• The small intestine absorbs nutrients from food; the large intestine absorbs water.<br>• Blood takes nutrients around the body.<br>• The outside of our teeth are covered with enamel and the inside have blood vessels and nerves.<br>• The front teeth are called incisors, the four sharp teeth are called canines, and the teeth at the back are called molars.<br>• Animals have different types of teeth, depending on what they eat. |
| Vocabulary | digestion, excretion, anus, small intestine, large intestine, oesophagus, saliva, acid, enzymes, incisors, canines, molars, predator, prey, producer, consumer |

| Year Group | 4 |
|---|---|
| Question | How do instruments make different sounds? |
| Theme | Sound |
| Overview | Children will learn that sound is generated when an object vibrates. They will be able to begin to make links between sound and the air vibrating around us. Children will learn that sound travels to reach our ears. They will learn that sound can travel round corners and through a medium. Through conducting an investigation, children will learn that a material can block sounds and understand that some materials absorb sound vibrations. Children will learn the patterns between pitch and sound. They will be able to describe the pattern between the pitch and sound of an object. |
| Substantive Knowledge | • Sound comes from vibrations. These vibrations create sound waves which move through mediums such as air and water before reaching our ears.<br>• There is no air in space so sound does not travel.<br>• Our ears vibrate in a similar way to the original source of the vibration, allowing us to hear many different sounds.<br>• Sound is used by many animals to detect danger, warning them of possible attacks before they happen.<br>• Sound travels more slowly than light so you see lightning before you hear thunder. |
| Vocabulary | vibration, vibrate, frequency, volume, pitch, medium, insulator, absorb |

| Year Group | 4 |
|---|---|
| Question | Does electricity flow easily through all objects? |
| Theme | Electricity |
| Overview | Children will learn that some appliances run on electricity and understand that some are powered by mains electricity and others through battery. They will learn about the different components that can make up an electrical circuit. They will experiment to be able to use given equipment to make the bulb light. They will use correct language to name the different components of a circuit. Children will learn about the purpose of a switch and understand that an open switch won't make a complete circuit but a closed switch will. Children will be introduced to the terms conductor and insulator. They will investigate which materials are good and poor conductors. |
| Substantive Knowledge | • Many appliances run on electricity. They can be plugged into the mains or use electricity from a battery.<br>• Batteries store electricity.<br>• Electricity can be very dangerous.<br>• Electricity needs a circuit to flow around in order to work.<br>• Some materials allow electricity to flow through them easily. These are called conductors.<br>• Many metals are good conductors of electricity.<br>• Some materials do not allow electricity to flow through them. These are called insulators. |
| Vocabulary | mains, crocodile clips, wires, bulb, battery, cell, battery holder, motor, buzzer, switch, conductor, insulator, electrical, appliances, circuit |

| Year Group | 4 |
|---|---|
| Question | Does water always freeze at the same speed? |
| Theme | States of Matter |
| Overview | Children will learn about solids, liquids and gases and how to identify them using their characteristics. They will learn how the particles in each state of matter are organised. Children will learn more about liquids through an investigation. They will learn how to use a thermometer and understand that the temperature of liquids will change to match the temperature of the area it is placed in. Children will learn about changing states. They will learn about the processes of melting, freezing. They will also learn about condensation and evaporation through the water cycle. |
| Substantive Knowledge | • Solids keep their shape, fill the same space, do not flow and can be cut and shaped.<br>• Liquids flow, fill the shape of the container they are in, cannot be held easily.<br>• Gases are often invisible, do not have a fixed shape and spread out to fill whatever container they are in.<br>• Thermometers are used to take the temperature of liquids.<br>• Melting and freezing are opposite processes that change the state of a material.<br>• The water cycle follows a cycle of evaporation, condensation, precipitation and collection. Water on Earth is always moving.<br>• Liquid evaporates<br>• Liquid evaporates quicker in warm temperatures. |
| Vocabulary | solid, liquid, evaporate, condensation, gas, changing state, thermometer, water cycle, water vapour |

| Year Group | 4 |
|---|---|
| Question | Are some animals more alike than others? |
| Theme | Living Things & their Habitats |
| Overview | Children will learn that animals can be grouped based on their physical characteristics and also based on their behaviour (what they eat etc). They will learn about different methods used to sort animals, starting with simple methods such as Venn diagrams before moving on to using classification keys using questions to help identify animals. Children will use their knowledge of classification keys to help them identify leaves and plants as well as animals. Children will learn that changes to environment can make it more difficult for living things to survive and reproduce and that in extreme cases this leads to extinction where an entire species dies. They will learn that human activity, such as climate change caused by pollution, can change the environment for many living things, endangering their existence. They will learn that many living things have already been made extinct as a result of human activity. |
| Substantive Knowledge | • Living things can be divided into groups based upon their characteristics<br>• Environmental change affects different habitats differently<br>• Different organisms are affected differently by environmental change<br>• Different food chains occur in different habitats<br>• Human activity significantly affects the environment |
| Vocabulary | kingdom, classification key, species, climate change, characteristics, identify, variety, human impact |

| Year Group | 5 |
|---|---|
| Question | How can we change materials? |
| Theme | Properties and Changes of Material |
| Overview | Children will begin the unit by recapping their knowledge of magnets and electrical conductors and insulators whilst learning about thermally conductive materials. They will learn that some materials are classed as insulators and will compare materials according to their properties. Children will learn that some materials can be mixed to form solutions. They will learn that some liquids absorb solids and know that the new mixture is called a solution but that the soluble is still there. Children will learn how to recover a substance from a solution using filtration and that some solutions need to be evaporated. Children will then use their knowledge to separate different materials from each other, planning how they will do so first. They will be able to use appropriate vocabulary to explain their choices. Children will learn that some changes are reversible and that others are irreversible. They will be able to explain whether a change is reversible or irreversible and why. |
| Substantive Knowledge | • Materials can be grouped in many different ways according to their various properties. These properties affect how a material is used.<br>• Irreversible changes, like burning, cannot be undone.<br>• Reversible changes, like melting and dissolving, can be changed back again.<br>• Mixtures can be separated out by methods like filtering and evaporating. A change is called irreversible if it cannot be changed back again.<br>• Examples of reversible changes. Melting: Melting is when solid converts into a liquid after heating. Example of melting is turning of ice into water. Freezing: Freezing is when a liquid converts into a solid.<br>• Mixing substances can cause an irreversible change. For example, when vinegar and bicarbonate of soda are mixed, the mixture changes and lots of bubbles of carbon dioxide are made. Burning is an example of an irreversible change. |
| Vocabulary | irreversible, dissolve, soluble, insoluble, solvent, solution, filter, sieve, saturation, conductor, insulator |

| Year Group | 5 |
|---|---|
| Question | How do parachutes work? |
| Theme | Forces |
| Overview | Children will learn that unsupported objects fall towards Earth due to gravity. They will learn that different objects will fall to ground at different rates. Children will recap their learning that forces act in pairs and use this to understand why objects don't fall through the ground if gravity is pulling objects towards the centre of the Earth. They will learn about the work of Isaac Newton in relation to gravity. Children will learn about air resistance and understand and experience first-hand its effect on moving objects. They will apply their knowledge of air resistance when learning about water resistance. Children will learn about pulleys, levers and gears and how these link to the learning to forces. |
| Substantive Knowledge | • Gravity is the pulling force acting between the Earth and a falling object, for example when you drop something. Gravity pulls objects to the ground.<br>• Surface resistance is the force on objects moving across a surface, such as an ice-skater skating on ice.<br>• Air resistance is the force on an object moving through air, such as a plane moving through the sky. Air resistance affects how fast or slowly objects move through the air.<br>• Water resistance is the force on objects floating on or moving in water.<br>• Some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. |
| Vocabulary | air resistance, water resistance, friction, gravity, Newton, gears, pulleys, force, push, pull, opposing, streamline, brake, mechanism, lever, cog, machine, pulley |

| Year Group | 5 |
|---|---|
| Question | Do all plants and animals reproduce in the same way? |
| Theme | Life Cycles |
| Overview | Children will learn that the life cycle of a living thing is a series of stages of development starting with a fertilized egg in animals. They will learn that there are differences between different creatures' life cycles. Children will learn about sexual and asexual reproduction. They will learn how both plants and mammals reproduce. They will learn about the life cycle of a flowering plant and about seed dispersal, knowing that this occurs by insects or the wind. Children will learn about and research the work done by naturalists such as David Attenborough and Jane Goodall. |
| Substantive Knowledge | • Asexual reproduction requires just one parent<br>• Sexual reproduction needs more than one parent.<br>• Pollinators are bright colours, strong smelling and have large amounts of nectar and pollen.<br>• Describe the stages of the life cycles of mammals, birds, insects and amphibians. (Frog, butterfly, bird and dog)<br>• Identify similarities and differences between the life cycles of different plants and animals. |
| Vocabulary | reproduction, sexual, asexual, dispersal, pollination, cell, fertilisation, gestation, metamorphosis, embryo |

| Year Group | 5 |
|---|---|
| Question | What shape is the moon and does it change? |
| Theme | Earth & Space |
| Overview | Children will learn about the planets in our solar system and the movement of the planets in relation to the Earth and sun. They will learn about the 8 planets and understand that Pluto was once thought to be a planet but was renamed a dwarf planet in 2006. Children will learn about day and night and understand that this is due to the rotation of the Earth. They will learn that the sun appears to move in the sky but link this to the rotation of the Earth, rather than the sun moving around the Earth. Children will learn about the moon moves in relation to the Earth. They will learn that some planets, such as Jupiter, have more than one moon. |
| Substantive Knowledge | • The sun is a star and the centre of our Solar System.<br>• The sun, Earth and moon are spherical.<br>• The earth rotates round its own axis once every 24 hours. This is how day and night occur.<br>• Different places on Earth experience day and night at different times.<br>• A moon is a celestial body that orbits a planet.<br>• There are 9 planets in the Solar System (including Pluto, which is currently classed as a Dwarf Planet).<br>• Earth is the third planet from the Sun and the only world known to support an atmosphere with free oxygen, oceans of liquid water on the surface and life. |
| Vocabulary | satellite, solar system, eclipse, universe, constellation, axis, rotating, lunar, solar, rotation, spherical |

| Year Group | 5 |
|---|---|
| Question | What are the stages in the human life cycle? |
| Theme | Animals including Humans |
| Overview | Children will learn about the different stages of the human life cycle. They will learn and understand that the human body goes through certain changes as we develop and grow. Children will learn how a foetus develops in the womb. They will learn about the gestation periods of other animals and compare these to a human. Children will learn about puberty and the changes that our bodies go through. They will learn about what happens to our bodies in older age and describe some of the changes that occur. |
| Substantive Knowledge | • Humans start out as a seed and go through the stages of baby, toddler, child, teenager, adult, elderly adult, death.<br>• Humans grow and change during each stage of development.<br>• The human body goes through changes during puberty; breast development, genital changes in males, voice changes, body hair growth, increase in height and the onset of menstruation.<br>• Humans go through puberty as a result of chemical messages to the brain called hormones. |
| Vocabulary | Development, baby – toddler – child – teenager – adult, puberty, gestation, womb, foetus, develop, egg, sperm |

| Year Group | 6 |
|---|---|
| Question | Is it possible to change how bright a bulb is or how loud a buzzer is? |
| Theme | Electricity |
| Overview | Children will extend their learning from Year 4 by learning that components have symbols and that these symbols are used to draw circuit diagrams. They will use this learning to be able to know whether a circuit is complete, whether a switch is on or off, whether the components will function and whether a cell is connected. Children will learn about voltage being a measure of the power of a cell to produce electricity. They will learn that as the voltage increases, so does the brightness of a bulb or the volume of a buzzer. Children will use their knowledge learned to investigate different statements and design and create an alarm. |
| Substantive Knowledge | • Batteries are a store of energy. This energy pushes electricity round the circuit.<br>• When the battery's energy is gone it stops pushing. Voltage measures the 'push.'<br>• The greater the current flowing through a device the harder it works.<br>• Current is how much electricity is flowing round a circuit.<br>• When current flows through wires heat is released. The greater the current, the more heat is released. |
| Vocabulary | voltage, components, electrical current, symbols, series circuit, diagram, energy |

| Year Group | 6 |
|---|---|
| Question | Why can I hear round corners but not see round corners? |
| Theme | Light |
| Overview | Children will recap their learning that light is a source of energy and that many light sources give off both light and heat. They will learn that light travels in straight lines and that light is reflected when it travels from a light source and then 'bounces' off an object. Children will learn about the work of Isaac Newton. They will learn that white light comprises all the colours of light. Children will learn that white light refracted by two surfaces in a prism will spread out so that all of its constituent colours can be seen and that this array of colours is called a spectrum. They will learn that the different colours travel at different speeds. Children will learn that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. They will use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. |
| Substantive Knowledge | • Light will travel in a completely straight line until it hits an object that will bend it.<br>• The light that is in a straight line are called 'light waves'.<br>• Refraction is the bending of light rays when it hits an object.<br>• Light doesn't travel as fast when it has to pass through mediums that are different, such as air, water or glass.<br>• Light that we see from the sun actually left the sun ten minutes before we see it.<br>• Light travels from light sources to our eyes or from light sources to objects and then to our eyes. |
| Vocabulary | light source, reflect, ray, bounce, beam, reflect, refraction, refract, prism |

| Year Group | 6 |
|---|---|
| Question | What makes bread rise? |
| Theme | Classification |
| Overview | Children will recap their learning on classification. They will learn how living things are classified according to common characteristics and based on similarities and differences. Children will classify plants and animals based on specific characteristics and be able to give reasons why. They will learn about microorganisms and be able to describe the characteristics of organisms using images as prompts. Children will learn that there are useful and harmful microorganisms. They will look in detail at yeast and learn that yeast is in fact a living substance. |
| Substantive Knowledge | • Living things are classified into broad groups, according to common observable characteristics and based on similarities and differences.<br>• Vertebrate animals can be either warm or cold-blooded. A cold-blooded animal cannot maintain a constant body temperature. The temperature of their body is determined by the outside surroundings.<br>• An invertebrate is an animal that does not have a backbone. 97% of all animal species are invertebrates.<br>• There are both useful and harmful microorganisms.<br>• Yeast is a living substance. |
| Vocabulary | classify, compare, bacteria, characteristics, classification, microorganism, organism, fungi, virus |

| Year Group | 6 |
|---|---|
| Question | Is our heart rate always the same? How long does it take to get fitter? |
| Theme | Animals including Humans |
| Overview | Children will learn about the human circulatory system and be able to explain how it works. They will learn that the heart is an involuntary muscle. They will learn the main parts and function of the it. Children will learn about the impact of diet, exercise, frugs and lifestyle on the way their bodies function. They will learn about how their pulse rates change after exercise through conducting investigations. Children will learn how water and nutrients are transported in humans and other animals. |
| Substantive Knowledge | • The heart pumps blood around the body.<br>• Blood carries oxygen and nutrients around the body.<br>• The right-hand side of the heart receives blood from the body and pumps it into the lungs.<br>• Lungs play a vital role in the circulatory system by adding fresh oxygen to the blood and sending it back to the heart.<br>• The left-hand side of the heart pumps the high-pressured oxygenated blood around the body.<br>• Regular exercise has many health benefits for children including healthy heart and lungs, muscle strength, positive impact on emotional and mental health as well as improving behaviour and concentration.<br>• Smoking cigarettes impacts negatively on the body. |
| Vocabulary | heart, blood, vessels, oxygenated, deoxygenated, valve, respiration, circulatory system, artery, vein, pulmonary, capillary,<br>Additional - alcohol, drugs, tobacco |

| Year Group | 6 |
|---|---|
| Question | Why do different species of animals look different? |
| Theme | Evolution and Inheritance |
| Overview | Children will learn about inherited and adaptive traits. They will learn that living things produce offspring of the same kind but that normally offspring vary and are not identical to their parents. Children will learn about adaptation and that animals and plants can adapt to suit their environment. They will learn that adaptations can lead to evolution. They will learn that natural selection is a key process. Children will learn about Charles Darwin and his work on adaptation and evolution. They will learn about survival of the fittest and how animals have had to adapt in order to survive. Children will learn about human evolution, looking at each part of the human civilisation and what they could/couldn't do at this time. |
| Substantive Knowledge | • Humans have inherited and adaptive traits.<br>• Evolution is a scientific theory used by biologists. It explains how living things change over a long time, and how they have come to be the way they are<br>• We know that living things have changed over time, because we can see their remains in the rocks.<br>• We know that the animals and plants of today are different from those of long ago.<br>• Living things produce offspring of their own kind but offspring vary and are not identical to their parents.<br>• Animals and plants are adapted to suit their environment in different ways. Adaptation may lead to evolution. |
| Vocabulary | evolution, adaptation, Charles Darwin, variation, offspring, environment, fossilisation, natural selection, inheritance |

# Progression in Working Scientifically (Disciplinary Knowledge)

Working Scientifically (Disciplinary Knowledge)

| Nursery | Reception | Area | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|---|
| • Begin to engage in open-ended activity and exploring with adult support<br>• Begin to handle tools safely such as scissors<br>• Talk through a problem with an adult and how they can overcome this<br>• Talk to an adult about the resources that they would like to use.<br>• Follow adults' lead with 'I wonder…' questions | • Engage in open-ended activity playing and exploring<br>• Take a risk, engage in new experiences and learn by trial and error<br>• Find ways to solve problems/ find new ways to do things/test their ideas<br>• Handle equipment and tools effectively<br>• Choose the resources they need for their chosen activity<br>• Create simple representations of events, people and objects<br>• Answer how and why questions about their experiences | Questioning and Predicting | • Ask simple questions | • Use observations and ideas to suggest answers to questions | • Ask relevant questions<br>• Start to make predictions | • Make sensible predictions<br>• Suggest possible further questions<br>• Use straightforward scientific evidence to answer questions and support their findings | • Use test results to make appropriate, linked predictions and ask further questions Recognise when other sources of information (secondary sources) will help answer questions that cannot be answered through practical investigations | • Make predictions for new values<br>• Use a range of sources to support own evidence and talk about how scientific ideas have developed over time<br>• Evaluate the reliability of their methods and suggest improvements Identify scientific evidence that has been used to support or refute ideas or arguments |
| | | Planning and Carrying out Investigations | • Recognise that questions can be answered in different ways *Perform simple tests | • Carry out pre-planned investigations – with support | • Use different types of scientific enquiries to answer questions<br>• Set up simple practical enquiries<br>• Set up simple comparative tests | • Set up fair tests Identify differences, similarities or changes related to simple scientific ideas and processes | • Plan different types of scientific enquiries to answer questions – including recognising and controlling variables where necessary<br>• Suggest sensible improvements to experiments | • Set up further comparative and fair tests in response to results |
| | | Taking & Recording Observations, Measurements and Results | • Observe closely<br>• Use simple equipment | • Gather and record data to help answer questions – with support | • Start to make systematic and careful observations<br>• Take accurate measurements using standard units<br>• Gather and record data to help answer questions<br>• Start to record findings using simple scientific language | • Make systematic and careful observations Take accurate measurements using standard units using a range of equipment including thermometers and data loggers<br>• Record findings using simple scientific language – demonstrate through drawings, labelled diagrams, keys, bar charts and tables | • Take accurate, precise measurements using appropriate equipment<br>• Know and explain when it is appropriate to take repeat measurements Gather, record, classify and present data in a variety of ways including scientific diagrams and labels, keys, graphs and tables | • Choose the most appropriate method for recording data and results of increasing complexity<br>• Make a series of observations, comparisons and measurements with precision |
| | | Explaining Results and Drawing Conclusions | • Talk about what they have found out | • Start to use simple scientific language in context<br>• Identify and classify objects as part of an investigation | • Report back on findings verbally<br>• Form conclusions from findings<br>• Suggest improvements to investigations<br>• Use straightforward scientific evidence to answer questions | • Classify and present data in a variety of ways to help in answering questions<br>• Report back on findings verbally and through written explanations, displays, presentations etc….<br>• Form sensible conclusions from findings | • Use scientific evidence to answer questions<br>• Use scientific evidence to support findings<br>• Use results to draw conclusions | • Present observations and data using appropriate methods<br>• Report and present results including conclusions, causal relationships and explanations<br>• Make conclusions consistent with evidence and related to scientific understanding |

# Progression in Physics (Substantive Knowledge)

| | Area | Nursery | Reception | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|---|---|
| Physics | Everyday Materials | • Talk about the differences between materials and changes they notice | • Ongoing discussions of different materials that the children use in their learning and play<br>• Learn the term waterproof and identify plastic and metal | • Distinguish between an object and the material from which it is made<br>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock<br>• Describe the simple physical properties of a variety of everyday materials<br>• Compare and group together a variety of everyday materials on the basis of their simple physical properties | • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses<br>• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching | | | | |
| | Light | | • Notice light and dark places in the immediate environment<br>• Begin to compare light and dark<br>• Look at shadows and the shapes that they make | | | • Recognise that light is needed in order to see things and that dark is the absence of light<br>• Notice that light is reflected from surfaces<br>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes<br>• Recognise that shadows are formed when the light from a light source is blocked by an opaque object<br>• Find patterns in the way that the size of shadows change | | | • Recognise that light appears to travel in straight lines<br>• Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye<br>• Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes<br>• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them |

| | Area | Nursery | Reception | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|---|---|
| Physics | Forces & Magnets | • Explore and talk about different forces they can feel | | | | • Compare how things move on different surfaces<br>• Notice that some forces need contact between two objects, but magnetic forces can act at a distance<br>• Observe how magnets attract or repel each other and attract some materials and not others<br>• Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet and identify some magnetic materials<br>• Describe magnets as having two poles<br>• Predict whether two magnets will attract or repel each other depending on which poles are facing | | • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object<br>• dentify the effects of air resistance, water resistance and friction, that act between moving surfaces<br>• Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect | |
| | Sound | | • Explore making sounds in a variety of different ways. | | | | • Identify how sounds are made, associating some of them with something vibrating<br>• Recognise that vibrations from sounds travel through a medium to the ear<br>• Find patterns between the pitch of a sound and features of the object that produced it *Find patterns between the volume of a sound and the strength of the vibrations that produced it<br>• Recognise that sounds get fainter as the distance from the sound source increases | | |

| | Area | Nursery | Reception | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|---|---|
| Physics | Electricity | | | | | | • Identify common appliances that run on electricity<br>• Construct a simple series electrical circuit identifying and naming its basic parts including cells, wires, bulbs, switches and buzzers<br>• Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery<br>• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit<br>• Recognise some common conductors and insulators, and associate metals with being good conductors | | • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit<br>• Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches<br>• Use recognised symbols when representing a simple circuit in a diagram |

| | Area | Nursery | Reception | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|---|---|
| | Earth & Space | | | | | | | • Describe the movement of the Earth and other planets relative to the sun in the solar system<br>• Describe the movement of the moon relative to the Earth<br>• Describe the sun, Earth and moon as approximately spherical bodies<br>• Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky | |

# Progression in Biology (Substantive Knowledge)

| | Area | Nursery | Reception | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|---|---|
| Biology | Seasonal Changes | • Talk about when it is icy and notice that this is when it is very cold. | • Talk about changes that happen in their immediate environment in different seasons | • Observe changes across the four seasons<br>• Observe and describe weather associated with the seasons and how day length varies | | | | | |
| | Animals | • Observe animal lifecycles such as caterpillars hatching and becoming butterflies<br>• Discuss animals of their choice, focussing on what they look like | • Describe animals that they have seen in stories, videos or in person, focusing on what they eat and where they live | • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals<br>• Identify and name a variety of common animals that are carnivores, herbivores and omnivores<br>• Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets) | • Notice that animals, including humans have offspring which grow into adults<br>• Find out about and describe the basic needs of animals, including humans, for survival (water, food, air) | • Identify that animals, including humans, need the right types and amount of nutrition and that they cannot make their own food – they get nutrition from what they eat<br>• Identify that humans and some other animals have skeletons and muscles for support, protection and movement | • Construct and interpret a variety of food chains, identifying producers, predators and prey | | • Describe the ways in which nutrients and water are transported within animals (including humans) |
| | Humans | • Name common body parts – head, arms, hands, legs feet and neck | • Explore how their own bodies move.<br>• Name common body parts – elbows, shoulders, ankles, back, fingers and toes | • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense | • Notice that humans have offspring which grow into adults<br>• Find out about and describe the basic needs for survival (food, water, air)<br>• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene | • Identify that humans need the right types and amount of nutrition and that they cannot make their own food – they get nutrition from what they eat<br>• Identify that humans have skeletons and muscles for support, protection and movement | • Describe the simple functions of the basic parts of the digestive system in humans<br>• Identify the different types of teeth in humans and their simple functions | • Describe the changes as humans develop to old age | • Identify and name the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood<br>• Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function<br>• Describe the ways in which nutrients and water are transported within humans (and other animals) |

| | Area | Nursery | Reception | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|---|---|
| Biology | Plants | • Watch seeds and plants grow. | • Observe plants and trees in their immediate environment and begin to talk about what they need to grow. | • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees<br>• Identify and describe the basic structure of a variety of common flowering plants, including trees | • Observe and describe how seeds and bulbs grow into mature plants<br>• Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy | • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers<br>• Explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow) and how they vary from plant to plant<br>• Investigate the way in which water is transported within plants<br>• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal | | | |

| | Area | Nursery | Reception | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|---|---|
| | Living Things & their Habitats<br><br>(Evolution & Inheritance – Yr6 only) | | • Discuss animals of their choice, focussing on what they look like, what they eat and where they live. | | • Explore and compare the differences between things that are living, dead and things that have never been alive<br>• Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other<br>• Identify and name a variety of plants and animals in their habitats – including microhabitats<br>• Describe how animals obtain their food from plants and other animals using the idea of a simple food chain – identify and name different sources of food | | • Recognise that living things can be grouped in a variety of ways<br>• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment<br>• Recognise that environments can change and that this can sometimes pose dangers to living things | • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird<br>• Describe the life processes of reproduction in some plants and animals | • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals<br>• Give reasons for classifying plants and animals based on specific characteristics<br><br>• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago<br>• Recognise that living things produce offspring, but normally offspring vary and are not identical to their parents<br>• Identify how animals and plants are adapted to suit their environment and that adaptations lead to evolution |

# Progression in Chemistry (Substantive Knowledge)

| | Area | Nursery | Reception | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|---|---|
| Chemistry | Rocks | | | | | • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties<br>• Describe in simple terms how fossils are formed when things that have lived are trapped within rock<br>• Recognise that soils are made from rocks and organic matter | | | |
| | States of Matter (incl Properties and Changes) | • Explore the melting of ice (ice cubes/ice lollies)<br>• Cook and explore combining, heating and cooling ingredients. | • Explore ice and other substances melting and solidifying. | | | | • Compare and group materials together according to whether they are solids, liquids or gases<br>• Observe that some materials change state when they are heated or cooled: measure or research the temperature at which this happens in degrees C (°C)<br>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature | • Compare and group everyday materials based on their properties, including hardness, solubility, transparency, conductivity (electrical and thermal) and magnetism<br>• Know some materials dissolve in liquid to form a solution and describe how to recover a substance from solution<br>• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating<br>• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic<br>• Demonstrate that dissolving, mixing and changes of state are reversible changes<br>• Explain that some changes result in the formation of new materials and that these changes are not usually reversible eg: changes from burning or the action of acid on bicarbonate of soda | |