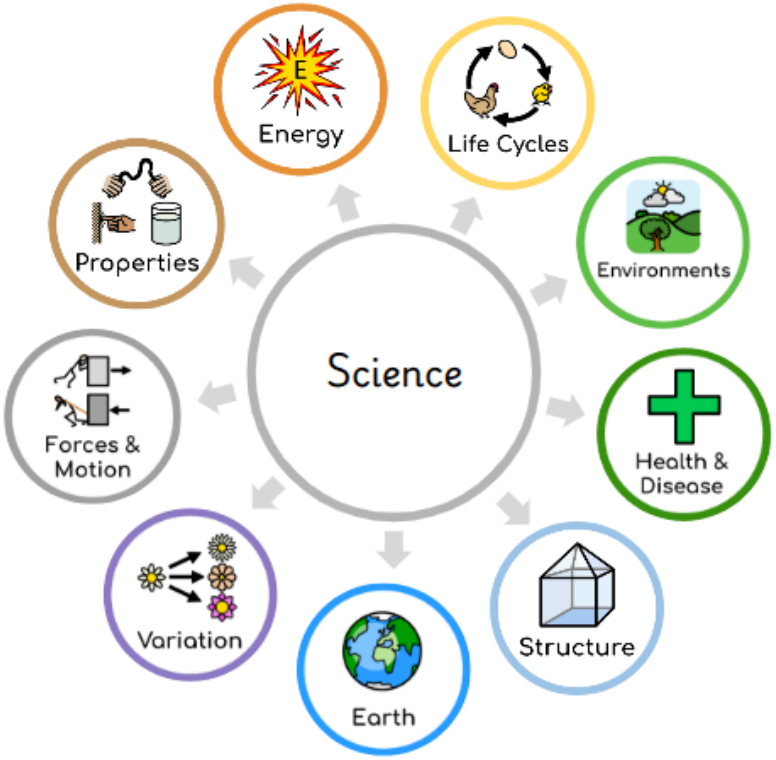
The Progression in Knowledge and Skills in Science

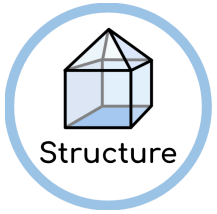
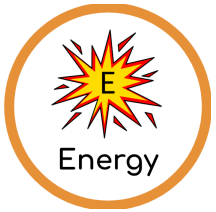
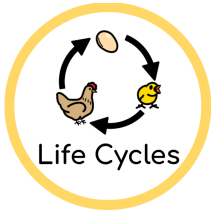
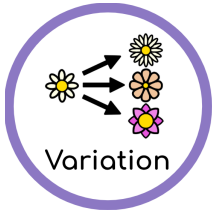
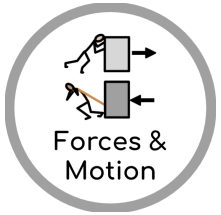


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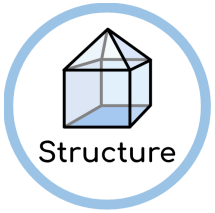
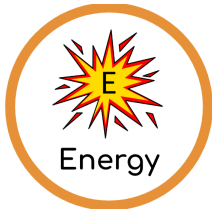
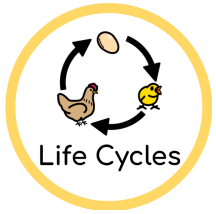
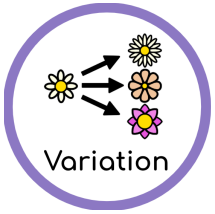
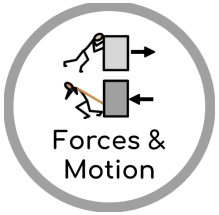


Science in the MNSP primary schools is a journey of discovery, curiosity and understanding. From the early years to Year 6, children build a secure foundation of scientific knowledge and skills that prepare them to explore the world around them with confidence and wonder. This curriculum is designed to ensure clear progression in children's substantive knowledge (the key facts, concepts and explanations children need to understand how the world works, broken down into nine 'Big Ideas': threshold concepts to help children build reliable schemata) and their disciplinary knowledge (the skills and thinking processes used by scientists, including observing, questioning, investigating and interpreting evidence). The curriculum builds year on year, ensuring concepts are introduced in simple ways and revisited with increasing depth; vocabulary and explanations become more precise and scientific and children connect ideas across topics and apply their knowledge in new contexts.

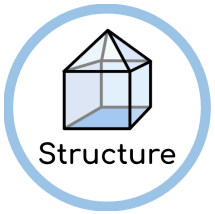
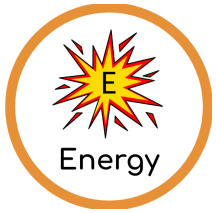
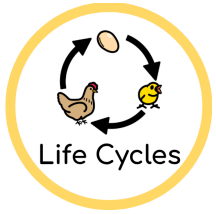
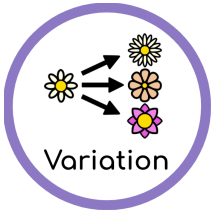
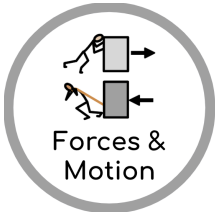
Our Big Ideas in Primary Science

	Living and non-living things have features that help us describe them, like colour, shape, size, texture or how they behave. Living and non-living things can be grouped according to their properties.		Structure means how something is built or put together. The shape of a system and how it is organised help it to carry out its job. Everything we see is made of particles. The way they fit together affects how strong, solid, bendy or stretchy a material is.
	Energy is what makes things happen. It helps us move, grow, stay warm and power machines. Energy cannot be created or destroyed, only changed from one form to another.		Our planet changes and has changed over time. It is wrapped in air (the atmosphere) which living things need to survive. Earth spins and causes day and night. It rotates around the sun.
	Living things move through different stages of growth and development. A life cycle shows how living things change, from beginning to end. It includes starting life, growing up and sometimes having offspring of their own.		Living things are not all the same. Even animals or plants of the same kind can look or behave differently. These differences can be passed down through parents. Living things change and have changed over generations.
	The environment is everything around us: plants, animals, air, water, and land. Living things depend on each other and their surroundings to survive. This is called interdependence.		For an object to move, stop, speed up, slow down or change direction, a force must be acting on it.
	Health means our bodies and minds feel good and work well. Disease happens when something goes wrong and makes us feel unwell. We can stay healthy by eating well, moving and keeping clean.		

How do the 'big ideas' at primary school lay the foundation for those used at MNSP secondary schools?

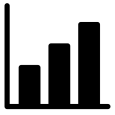
	Substances and properties Chemical reactions *The big idea 'properties' is also applied to Biology- and Physics- based units to consolidate children's understanding of the concept of properties of living and non-living things.*		The cellular basis of life Particles and structure Matter
	Sound, light and waves Electricity and magnetism *The big idea 'energy' is also applied to Biology and Chemistry-based units to consolidate children's understanding of the concept of energy, e.g. energy transfer through trophic levels of a food chain, energy transfer when studying materials and photosynthesis in plants.*		Dynamic Earth Earth in Space Earth's Atmosphere
	Heredity and life cycles		Variation, adaptation and evolution
	Organisms and their environments		Forces and motion
	Health and disease	<u>MNSP Secondary School 'Big Ideas' in:</u> **Biology** **Chemistry** **Physics**	

How do the 'big ideas' link to The Education People scheme of learning?

	TEP Big Idea 2: Living (and non living) things can be grouped in a variety of ways		TEP Big Idea 1: There is a relationship between structure and function. TEP Big Idea 4: Everything on Earth exists in one of three states: solid, liquid, gas, and the state of matter can change.
	TEP Big Idea 9: Energy makes things happen. It cannot be created or destroyed.		TEP Big Idea 10: The movement of Earth affects the time of day.
	TEP Big Idea 3: Living things move through different stages of growth and development		TEP Big Idea 8: Living things have changed over time.
	TEP Big Idea 7: Living things depend on each other and on their environment		TEP Big Idea 6: Changing the movement of an object requires a force to be acting on it
	TEP Big Idea 5: Lifestyle choices affect survival and health.	The Education People scheme of learning outlines ten threshold concepts as statements about science. These are adapted from Wynne Harlen's Ten Big Ideas in Science (2009): https://www.stem.org.uk/resources/library/resource/35234/1. These have been simplified for our youngest children and to ensure clear progression to and cohesion with the secondary science curriculum.	

The Progression in Knowledge & Skills in Science

Knowledge and skills in science are categorised into four strands, in which children are assessed at regular intervals: scientific knowledge and understanding, experimental and investigation skills, analysis and evaluation of results and scientific oracy and literacy. The science curriculum has been organised in this way to reflect the weighting given to the skills in working scientifically outlined by the National Curriculum and the expectation that substantive scientific knowledge is not simply memorised and understood, but applied to real-life contexts through children's scientific inquiries.

1. Scientific knowledge and understanding 	This strand focuses on building pupils' grasp of key scientific concepts, facts and processes across biology, chemistry and physics. It helps children make sense of the world around them, laying the foundations for deeper enquiry and enabling them to apply knowledge to new contexts.
2. Experimental and investigation skills 	Here pupils learn how to plan and carry out practical enquiries, using equipment safely and selecting appropriate methods. These skills encourage curiosity, creativity and problem-solving, allowing children to test ideas, design fair investigations and develop confidence in working scientifically.
3. Analysis and evaluation of results 	This strand develops pupils' ability to interpret data, identify patterns and draw conclusions from their observations. It supports critical thinking by encouraging children to question outcomes, consider reliability, and refine their ideas based on evidence.
4. Scientific oracy and literacy 	Pupils build the language and communication skills needed to express scientific ideas clearly, both orally and in writing. This includes using subject-specific vocabulary, explaining reasoning, and presenting findings, which strengthens understanding and allows them to share and debate scientific thinking effectively.

1. Scientific knowledge and understanding

The Progression in Substantive Knowledge by Threshold Concept (Big Ideas)

Properties

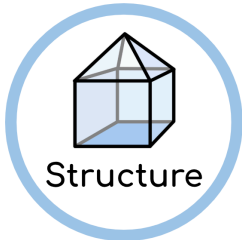


Living and non-living things have features that help us describe them, like colour, shape, size, texture or how they behave. Living and non-living things can be grouped according to their properties.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Materials Properties is a word that helps us to describe the characteristics (the way they look, feel or act) of different materials. We can group different materials together based on their properties. **Plants** Deciduous trees change and drop their leaves with the seasons. Evergreen trees stay green and keep their leaves all year round. **Animals including humans** All birds lay eggs. They all have beaks, feathers, two legs and two wings - most birds can fly but some cannot. Birds have lungs and breathe air. They are warm blooded. All fish live in water and have	**Materials** Everyday objects are made from materials that have different properties. Different materials have different properties, making them suitable for specific purposes and uses. **Living things and their habitats** Living things can grow, change, move, reproduce and use their senses. Dead things were once alive (were once part of a living thing or a living thing that has died) but no longer show signs of life. Things that have never been alive are objects or materials that were never part of a living thing. Habitats have specific properties — like temperature, moisture, light levels, and	**Forces and magnets** Magnets are metals that attract other metals (eg iron, steel and nickel). Every magnet is a metal, but not all metals are magnets. **Rocks and soils** Rock, or stone, is a hard material. Different groups of rock have their own unique appearance and set of physical properties: Sedimentary rocks are laid down in layers which are made from broken up bits of other rocks and remains of animals and plants that have been squashed together. They can be soft and wear away easily. Igneous rocks are made when molten rock (lava or magma from a volcano) cools down. They are very hard and do not wear away easily.	**States of matter** Solids, liquids and gases are called the three states of matter. Each one has its own unique set of properties (link to **Structure**). **Electricity** Some appliances require mains electricity, and some require batteries to operate. Appliances convert electrical energy into other types of energy. Some materials let electricity pass through them easily. These materials are known as electrical conductors. Some materials do not allow electricity to pass through them. These materials are known as electrical insulators. **Animals including humans** Different animals have different	**Properties and changes of materials** A thermal conductor is a material that lets heat pass through it easily. Thermal refers to anything related to heat. A conductor is something that allows the flow of a particular thing. A thermal insulator is a material that reduces or prevents the transfer of heat. Thermal refers to anything related to heat. Insulator is a material or substance that does not easily allow the transfer of electricity, heat, or sound.	**Living things and their habitats** The classification of animals involves organising them into groups based on shared characteristics. This is known as taxonomy. This helps scientists to study and understand the enormous variety of living organisms. Animals can be sorted in a variety of ways eg vertebrates, invertebrates, warm-blooded, cold-blooded or into groups such as annelids, molluscs, arachnids. Classification enables scientists to identify relationships among species, predict traits, and communicate biological information effectively. It is a crucial tool in simplifying the study of animals and contributing to our overall understanding of the natural

scales. They don't have legs. They have gills that allow them to breathe underwater. Most fish lay soft eggs. They are cold blooded. All mammals have hair. Mammals have lungs and breathe air, but not all live on land. Mammals are warm blooded. They give birth to live young. All amphibians can live on land and in water. Most have slimy skin. Most amphibians lay eggs. They are cold blooded. All reptiles have dry, scaly skin. They breathe air, they are cold-blooded and lay eggs. Reptiles can live on land and in water. Carnivores eat other animals and do not eat plants. Herbivores eat plants and do not eat other animals. Omnivores eat both plants and other animals.	shelter — that make them suitable for certain organisms. Animals and plants are suited to habitats because of the match between their needs and the habitat's properties. Microhabitats differ in properties, e.g. under logs is damp and dark, while a sunny patch is warm and dry. **Animals, including humans** All animals, including humans are born, get older and grow bigger and most will go on to have offspring of their own. All animals are at a stage in their lifecycle.	Metamorphic rocks are rocks that have been changed over time by intense heat and pressure deep underground. They are hard and can be polished.	teeth based on their diet: Herbivores are animals that only eat plants. They need flat molars and flat incisors. Carnivores are animals that only eat meat. They need canines and incisors. Humans are omnivores eat plants and meat. They need all three types of teeth –canines, incisors and molars. **Living things and their habitats** Classification is putting things into groups. Living things can be divided into these groups or 'classified' by looking at similarities and differences between the way they look and behave. Animals are divided into two main groups. Animals that have a backbone (spine) are called vertebrates. Animals that do not have a backbone are called invertebrates. A classification key, also known as an identification key or dichotomous key, is a tool used by scientists and naturalists to help identify and categorise living things.		world.

Structure

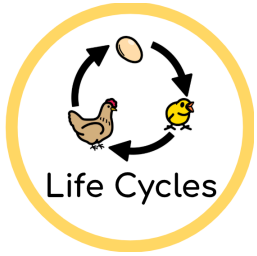


Structure means how something is built or put together. The shape of a system and how it is organised help it to carry out its job. Everything we see is made of particles. The way they fit together affects how strong, solid, bendy or stretchy a material is.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Materials An object is something that you can touch. A material is what the object is made from. Materials which have the property of being absorbent, soak up liquids, for example water. Waterproof means that water cannot pass through an object or material. It is a material that keeps water out. **Plants** Roots keep the plant in the ground and hold it up. They also take in water from the soil. Flowers, petals, roots, stem and leaves are all parts of flowering plants. Trunks, branches, bark, blossom and fruit are parts of a tree. Trees are plants. **Animals including humans** There are many different parts of the human body, and each one has a different job to do. Humans have five senses. These are touch, sight, smell, hearing and taste. Eyes are associated with sight, ears with hearing, nose with smell, skin with touch and tongue with taste.	**Materials** The shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	**Plants** Plants spread their seeds in lots of different ways. This is called seed dispersal. Some seeds are transported by the wind and are shaped to float, glide or spin through the air. This is important to prevent seeds from needing to compete for space, light, water and nutrients. Roots: keep the plant steady and upright in the soil. Root hairs absorb water and nutrients (food) from the soil. Stem: carries water and nutrients to different parts of the plant. The stem of a tree is called its trunk. This often divides into smaller branches. Leaves: Use light from the Sun, along with carbon dioxide from the air and water to make food for the plant. Flowers: are involved in plant reproduction and produce seeds from which new plants grow. Plants need water to make their own food. Water is absorbed and transported through the stem, leaves and roots. **Light** We need light to see. Light can	**States of matter** Solids: stay in one place and can be held, keep their shape, always take up the same amount of space and can be cut or shaped. Liquids: flow or can be poured easily (they are not easy to hold) and change their shape depending on the container they are in; they always take up the same amount of space (their volume stays the same). Gases: are often invisible, do not have a fixed shape (they spread out and change their shape and volume to fill up whatever container they are in); they can be squashed Solids, liquids and gases are called the three states of matter. Each one has its own unique set of properties When some solids are heated, they melt and turn into a liquid. The temperature this happens at is called the melting point, and it is measured in degrees Celsius (°C). When a liquid is cooled, it freezes and turns into a solid. Freezing happens at the same temperature as the melting point. Higher temperatures speed up evaporation and lower humidity	**Properties and changes of materials** Materials that make the best thermal insulators are typically those that trap air well. These materials trap small pockets of air that act as barriers to slow down the transference (movement) of heat, helping to keep things warm or cool. Air is a good insulator because it is a poor conductor of heat. Filtering is a method to separate a solid from a liquid in a mixture. It involves passing the mixture through a filter, often made of paper or another porous material. The liquid passes through, leaving the solid behind. Sieving is a method to separate different-sized particles in a mixture. A sieve, which is a tool with holes of a specific size, is used. Smaller particles pass through the holes, while larger ones are retained. Evaporation is a method to separate a solute from a solvent in a mixture. It involves heating the mixture to allow the solvent to turn into vapor and leave the solute behind. The vapor can be condensed back	**Animals including humans** The circulatory system has three main parts: the heart (a muscular organ that pumps blood), blood vessels (arteries, veins, and capillaries), and blood (which carries oxygen, nutrients, hormones, and waste products). The circulatory system transports nutrients, water and oxygen to the entire body. Blood is made from four parts: Red blood cells which transport oxygen. White blood cells which protect against disease. Blood platelets help the blood to clot and form scabs to repair a cut. Plasma is a yellowy liquid that carries these cells and important nutrients around your body. The circulatory system transports water and nutrients around the body. Not all animals have the same system – some have double circulatory systems and some have single, some have closed circulatory systems and some have open.

		come from many different sources, such as the Sun, stars, torches, lamps and candles. **Animals including humans** Muscles often work in pairs, pulling on your bones so that you can move. Your skeleton has joints which allow movement. When a muscle contracts it gets shorter and then relaxes to return to its normal length. **Rocks and soils** Some rocks are more durable than others. These rocks are good for building as they last a long time without breaking or getting weaker. Some rocks, such as sandstone or chalk, let water soak through them. They are called permeable rocks. Other rocks, such as slate, do not let water soak through them. They are called impermeable rocks. **Forces and magnets** Magnets can vary in strength based on their size, shape (eg horseshoe, bar and ring), and the type of material from which they are made. Some magnets are stronger than others.	(dry air) helps things dry faster. **Animals including humans** Humans have three types of teeth. These are: Molars - These are the teeth at the back of your mouth which are used for grinding up food. Incisors - The teeth at the very front of your mouth that are used for cutting food. Canines - The teeth at the sides of your mouth between the incisors and the molars. These are used for tearing up food.	into a liquid. A reversible change in science is a change that can be undone or reversed, and the original substance or materials can be recovered. Some examples of reversible changes include melting, freezing, mixing, dissolving, evaporating and condensing. An irreversible change is a permanent change that creates something new or different. It cannot be undone. Some examples of irreversible changes include heating, mixing and burning.	

Life Cycles

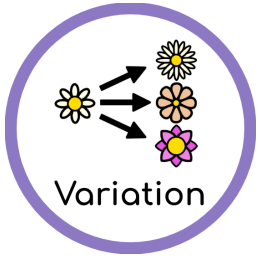


Living things move through different stages of growth and development. A life cycle shows how living things change, from beginning to end. It includes starting life, growing up and sometimes having offspring of their own. Parents and offspring share characteristics.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Plants Plants change across the seasons. A deciduous tree loses its leaves in autumn, remains bare in winter, grows new leaves in spring, and is full in summer. This shows that plants go through a cycle of growth and change. Animals grow and change over time. A chick hatches from an egg and grows into a chicken. A puppy grows into a dog. These changes are part of a life cycle, even if the term isn't used yet.	**Plants** Plants grow from seeds or bulbs. These contain the biological information needed to grow into a new plant. Germination is the process where a seed begins to grow. Plants need water, light and warmth to grow and stay healthy. **Animals, including humans** Animals, including humans, have offspring that grow into adults. Young animals often look different from their parents but gradually resemble them more as they grow. Growth involves changes in size, shape and abilities. Humans need food, water and air to survive and grow.	**Animals, including humans** Bones grow and change over time. The number and size of bones in the human body increase as a person grows. The human skeleton provides support, protection and enables movement. Muscles work with bones to allow movement. Nutrition supports growth and development. Different animals have different body structures depending on their stage of life and lifestyle.	**Animals, including humans** Teeth change as humans grow. Baby teeth fall out and are replaced by adult teeth. The digestive system processes food to support growth and health. Bones and muscles continue to develop during childhood. Height and body structure can be inherited traits passed from parents to children.	**Living Things and their habitats** A lifecycle is the different stages of life for all living things, including humans. There are normally four major events in the lifecycle of animals: birth - growth - reproduction – death. There are some significant differences in the specific developmental processes for the lifecycles of mammals, amphibians, insects, and birds. **Animals, including humans** • There are six stages in the human lifecycle: 1. Foetus - a baby is growing inside the womb. 2. Baby - A baby is born after spending nine months inside the womb. 3. Childhood - you learn to walk and talk. 4. Adolescence - stage between childhood and adulthood when children become teenagers and bodies develop during puberty. 5. Adulthood - body is fully developed and this is the stage where some women may have babies. 6. Old age - the last stage in the lifecycle of a human	**Inheritance and evolution** Traits such as eye colour, height and hair type are inherited from parents. Inherited characteristics are passed through genes from one generation to the next. Variation exists within species. Individuals have different traits. Adaptations help organisms survive in their environments. Fossils provide evidence of how living things have changed over time. Evolution is the gradual change in species over generations due to natural selection. Life cycles are shaped by adaptation and survival. Organisms reproduce to pass on traits that help them survive.

				• Puberty is a natural process during which an individual undergoes physical and hormonal changes, marking the transition from childhood to adulthood. These changes include the development of characteristics, such as the growth of body hair, changes in voice pitch, and the onset of reproductive capabilities. Generally, the larger the animal, the longer the gestation period. Humans have a gestation period of around nine months. **<u>Plants</u>** Plants reproduce through pollination, fertilisation and seed dispersal. Pollination involves the transfer of pollen from one flower to another, often by insects or wind. Fertilisation occurs when pollen meets the ovule, forming a seed. Seeds are dispersed by wind, water, animals or an explosion. New plants grow when seeds land in suitable conditions.	

Variation



Living things are not all the same. Even animals or plants of the same kind can look or behave differently. These differences can be passed down through parents. Living things change and have changed over generations.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals, including humans: Animals differ in body coverings (fur, feathers, scales, skin). Animals have different numbers of limbs, types of teeth and body shapes. Humans vary in height, hair colour, eye colour, and other observable traits.	Living things and their habitats: Different species are suited to different habitats due to physical differences. Animals of the same species may show differences in colour, size, or behaviour. Plants vary in leaf shape, flower colour, and growth patterns depending on habitat.	**Rocks** Fossils are the preserved remains of a dead plant or animal. Fossils come in all shapes and sizes. Fossils are formed through a process of multiple stages called fossilisation, and this takes place over many, many years. Soil is made from organic matter - dead rotting plants, rock, air and water. Soil also contains lots of animals, for example, earth worms and micro-organisms too tiny to see with the naked eye. **Animals, including humans** Animals vary in their diets (herbivore, carnivore, omnivore). Skeleton types vary: endoskeletons (humans), exoskeletons (insects), hydrostatic skeletons (worms). Muscle structure and movement vary across species. **Plants** Plants vary in their needs for sunlight, water, and soil type. Flowering vs non-flowering plants. Variation in leaf shape, flower structure, and seed dispersal	**Living things and their habitats** Organisms are grouped based on observable differences. Species show variation in response to environmental changes (e.g. drought tolerance). Classification keys rely on variation in traits (e.g. number of legs, body covering). **Animals including humans** Teeth types vary by diet: incisors, canines, molars. Digestive systems differ across species. Predator/prey relationships depend on physical and behavioural variation.	**Living things and their habitats** Life cycles vary between mammals, amphibians, insects, and birds. Reproductive strategies vary (e.g. egg-laying vs live birth). Offspring show variation from parents (precursor to Year 6 inheritance). **Animals including humans** Humans vary in growth rates, physical development, and ageing patterns. Puberty introduces variation in body changes. Differences in lifespan and health outcomes.	**Evolution and Inheritance** Evolution explains how the living things on our planet today have slowly developed from simpler life forms that lived millions of years ago. By comparing fossils from older and newer layers of rock, scientists can see how things have changed over time. When living things reproduce, they pass on characteristics to their offspring. This is known as inheritance. Variation explains the different features and characteristics of living things. Variation is a key factor in the evolution and adaptation of living things to their environments. Natural selection is the process by which living things with traits better suited to their environment are more likely to survive and reproduce, passing those beneficial traits on to their offspring. Adaptation is the process by which living things develop traits or characteristics that enhance their ability to survive and reproduce in their specific environment. **Living things and their habitats**

		methods.			Microorganisms, plants, and animals show wide variation in structure and function. Classification systems reflect evolutionary relationships and variation. Species are grouped based on shared and differing traits.

Environments



The environment is everything around us: plants, animals, air, water, and land. Living things depend on each other and their surroundings to survive. This is called interdependence.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals, including humans Animals live in different habitats that provide the food, water and shelter they need to survive. Different animals are suited to different environments. Polar bears live in cold regions and camels live in hot deserts. Animals can be grouped by what they eat. Carnivores eat other animals, herbivores eat plants and omnivores eat both. **Plants** Plants grow in places where they can get sunlight, water and space. Some plants grow in shaded areas while others need full sunlight. The type of plant found in a habitat depends on the conditions of that environment.	**Living things and their habitats** A simple food chain shows the flow of food (energy) from one living thing to another. For example, a plant (producer) is eaten by a rabbit (prey), which is then eaten by a fox (predator). A habitat is a place where an animal or plant lives. It is an environment that has everything animals and plants need to live. A microhabitat is a very small habitat that also has everything animals and plants in it, need to live. Just like animals, different plants are suited to different habitats and microhabitats. Habitats and microhabitats provide plants with what they need to survive. Each habitat has specific features like temperature, water availability, and types of food that meet the individual needs of the plants and animals living there. **Plants** Plants need water, light and warmth to grow and stay healthy. Different plants grow better in different conditions. The presence or absence of certain plants can affect the animals that live nearby.	**Rocks** Soil type affects plant growth and the kinds of organisms that live in an area. Soils are made from rock particles and organic matter. Different types of soil retain water differently and support different ecosystems. **Plants** Plants make their own food using sunlight in a process called photosynthesis. Photosynthesis allows plants to grow and provide energy for other organisms. Plants are producers in food chains and form the base of most ecosystems.	**Animals including humans** All living things need energy from food to grow, repair themselves and reproduce. Animals need to eat plants or other animals to get their energy. The flow of energy from one living thing to another is shown in the arrows in a food chain. **Living things and their habitats** An environment refers to the surroundings or conditions in which living things exist and interact. This can be made up of natural and human-made features. Humans affect the environment in many ways for many different reasons. Changes to environments can damage habitats and cause danger to animals and plants that live in them, including us. Conservation is the careful protection and management of our natural environment to keep it healthy and balanced for the benefit of all living things (plants, animals, including humans), now and in the future.	**Space** Seasonal changes affect habitats and animal behaviour. The tilt and orbit of the Earth cause changes in daylight and temperature. Some animals migrate or hibernate depending on environmental conditions. **Living things and their habitats** Life cycles are influenced by environmental factors such as temperature, food availability and habitat quality. Organisms interact with each other and their environment. Predators, prey, producers and consumers all play roles in maintaining balance in ecosystems.	**Inheritance and evolution** Organisms survive better in environments they are suited to. Adaptations help organisms live in specific habitats. Environmental pressures such as climate or competition can lead to changes in species over time. Variation within a species allows some individuals to survive better than others. Over time, these traits become more common in the population. **Living things and their habitats** Organisms are part of complex food webs that show how energy flows through ecosystems. Removing one species from a food web can affect many others. Human activity such as pollution, deforestation and urbanisation can disrupt ecosystems. Conservation efforts aim to protect habitats and maintain biodiversity. Microorganisms are living things that are too small to be seen without a microscope. Some microorganisms are helpful, such as those used in baking, brewing and digestion. Other microorganisms can cause disease or decay. Microorganisms play a vital

					role in ecosystems by breaking down dead matter and recycling nutrients. Decomposers such as bacteria and fungi return nutrients to the soil, supporting plant growth. Microorganisms can be found in soil, water, air and inside living organisms. The balance of microorganisms in an environment affects the health of plants, animals and humans.

Health & Disease



Health means our bodies and minds feel good and work well. Disease happens when something goes wrong and makes us feel unwell. We can stay healthy by eating well, moving and keeping clean.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals, including humans Humans need food, water and shelter to survive. Exercise helps the body stay strong and healthy. Rest is important for recovery and growth. Different types of food help the body in different ways. Fruit and vegetables support health, while sugary foods can cause harm if eaten too often.	**Animals, including humans** Exercise strengthens muscles and bones and supports heart health. Washing hands and brushing teeth help prevent illness by removing harmful germs. A balanced diet provides the nutrients needed for growth, energy and repair. Germs are tiny organisms that can cause illness. Hygiene practices reduce the spread of germs and protect against disease. **Plants** Plants need water, light, the right temperature and air to grow and keep healthy.	**Animals, including humans** Animals, including humans, cannot produce their own food. Animals get the energy they need to survive from a balanced and varied diet with specific types and amounts of nutrients. Humans need a balanced diet of fruit and vegetables, carbohydrates, protein, dairy and fat to stay healthy. It is important to eat a healthy diet with enough protein to help your muscles grow properly. We find protein in meat, fish, eggs and beans. To keep pets healthy, provide balanced nutrition, regular exercise, routine veterinary care, proper hygiene, and a loving environment. Animals, including humans need a skeleton for support, protection of organs, and to enable movement. It is important to eat a healthy diet with enough calcium to help your bones grow. We find calcium in dairy products like milk and cheese. People who engage in more physical activity often develop stronger muscles because exercise promotes muscle growth and strength. **Plants** All plants are alive. They need air (carbon dioxide), light, water, nutrients, and the right temperature to grow and stay	**Animals, including humans** Poor diet and hygiene can lead to tooth decay and other health problems. The mouth is the entry point for digestion and also a site where bacteria can grow if hygiene is poor. Internal systems such as digestion and circulation work together to maintain health.	**Properties and changes of materials** Burning materials can release harmful gases that affect air quality and human health. Exposure to polluted air can lead to respiratory problems. Some materials are toxic and can cause harm if inhaled or touched. Environmental factors such as pollution and chemical exposure influence human wellbeing.	**Animals, including humans** • When you engage in physical activity, especially aerobic exercises like running or cycling, your heart rate typically increases. This is because your muscles require more oxygen and nutrients to meet the increased demand for energy during exercise. The heart responds by pumping more blood, leading to a higher heart rate. It is important to eat a healthy diet so that we have energy, our brains can concentrate, we can fight off infections and so that we do not become overweight which can cause long-term poor health. We need sleep to help us recover and recharge. This is good for our mental and physical health. Some drugs are helpful, like medicines. These should be taken according to the instructions. Taking drugs, drinking alcohol and smoking can have very harmful effects on our bodies. They are highly addictive which means it can be difficult to stop and this has damaging, long-term effects on our bodies. **Living things and their habitats** Microorganisms are living things that are too small to be seen without a microscope.

		healthy. Some plants need more or less of these than others. Many plants rely on animals and insects (like bees*) to reproduce. To make a seed, a flower* needs to be pollinated. This means that pollen from one flower needs to travel to another. Bees and other animals move pollen from plant to plant. This is called pollination.			Some microorganisms are beneficial, such as those used in digestion, baking and medicine. Other microorganisms can cause disease or decay. Microorganisms can spread through air, water, surfaces and contact with infected organisms. Vaccines help the body build immunity against harmful microorganisms. The balance of microorganisms in the body and environment affects health.

The Earth

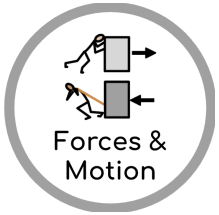


Our planet changes and has changed over time. It is wrapped in air (the atmosphere) which living things need to survive. Earth spins and causes day and night. It rotates around the sun.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Seasonal Changes The weather changes across the seasons. In summer, the weather is usually warm or hot because of the Sun. In autumn, the Sun is visible for less time and the weather becomes cooler. In winter, the Sun is visible for a short time and the weather is cold. In spring, the Sun is visible for longer and the weather begins to warm. The length of daylight changes throughout the year. Plants and animals respond to seasonal changes in temperature and light. Trees lose leaves in autumn and regrow them in spring. Animals may change behaviour or appearance with the seasons.	**Living things and their habitats** Habitats are affected by seasonal changes. Some animals hibernate during winter when food is scarce and temperatures are low. Plants may stop growing or die back in colder seasons. The availability of sunlight and water affects plant growth across the year.	**Light** In the morning, shadows are longer when the Sun is lower. As the day goes on, shadows get shorter when the Sun goes higher. In the evening, shadows get longer again as the Sun starts to go down. **Rocks** Rocks are formed in different ways and can be classified as igneous, sedimentary or metamorphic. Sedimentary rocks often contain fossils which show evidence of past life and environmental conditions. Fossils form when living things are buried and preserved in rock over long periods. Soils are made from rock particles and organic matter. Different types of soil support different plant life and ecosystems.	**States of matter** The water cycle involves changes in state caused by heating and cooling. Evaporation occurs when water is heated and turns into water vapour. Condensation occurs when water vapour cools and turns back into liquid water. Precipitation returns water to the Earth's surface. These processes are driven by the Sun's energy and affect weather and climate.	**Space** Life can survive on Earth because Earth's position in the solar system means we have energy, the right temperature and a stable climate. The Earth rotates around the sun whilst also spinning on its axis. At the same time, the Moon is orbiting the Earth. This is a constant repeating pattern. The Moon orbits the Earth and spins on its axis once each time it orbits the planet. The sun, Earth and moon are approximately spherical bodies. The Earth is one of eight planets that orbit around the Sun. The planets are called Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. Earth rotates constantly on its axis. It takes 24 hours or one day for a full rotation. When parts of the Earth face the Sun, it is daytime. When Earth is facing away from the Sun, this is night-time. Shadows change direction because the Earth is rotating. The Earth rotates from west to east. Shadows point in different directions as the Earth spins. Noon is when shadows are shortest because the sun is right above you. **Forces** Gravity is a force that acts at a	**Evolution and inheritance** Fossils provide evidence of how the Earth and its life forms have changed over time. Rock layers can show the sequence of events in Earth's history. Environmental changes such as volcanic eruptions, asteroid impacts and climate shifts have shaped the Earth's surface and ecosystems. Adaptations in organisms reflect long-term changes in Earth's conditions. The Earth's surface is dynamic and constantly changing due to natural forces.

				distance. Gravity attracts all objects towards each other. Larger objects have a stronger gravitational pull so heavy and light objects fall at the same speed. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.	

Forces & Motion

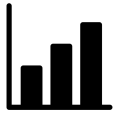


For an object to move, stop, speed up, slow down or change direction, a force must be acting on it.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Materials Objects made from different materials behave differently when pushed or pulled. Some materials bend or stretch while others stay rigid. The way an object moves depends on its shape and the material it is made from. Rolling, sliding and bouncing are types of movement that depend on surface and force. **Seasonal changes** Wind is a moving force that can push objects such as leaves or branches. Rain and snow fall due to gravity pulling water droplets toward the Earth.	**Materials** Materials can be shaped by applying forces such as bending, squashing, twisting and stretching. Some materials return to their original shape after being stretched or compressed. The way a material responds to force depends on its properties. Forces can change the shape of an object without breaking it.	**Forces and magnets** We need forces to make things move. A contact force can be a push or a pull. We can make things move faster, slower or even stop if the size of the force changes. A contact force can work against the movement of an object and act in the opposite direction (link to push/pull). Some surfaces affect the movement of an object more than others. Not all forces need contact. A magnetic force can act at a distance. Magnets have two ends. These are called north pole and south pole. When two of the same poles are placed close together, they repel (push apart) each other. When two different poles are close, they attract (pull together) each other.	**States of matter** Gravity pulls liquids downwards when they are poured. Evaporation and condensation involve movement of particles due to changes in energy. The movement of particles in gases causes them to spread out and fill a space. **Electricity** Electricity flows through a circuit when a force from the power source pushes electrons through wires. Switches control the flow of electricity by opening or closing the circuit.	**Forces** Friction is a force between two surfaces that are in contact and sliding, or trying to slide, across each other. Friction always works in the direction opposite to the direction in which the object is moving or trying to move. Friction always slows a moving object down. The greater the amount of friction, the greater the force required to move an object. Air resistance is a type of friction between air and another material. It is a force that opposes the movement of an object as it moves through the air. Objects with a large surface area create more air resistance so they move more slowly though air. Water resistance is friction between water and an object that is moving through the water. This force acts upwards against gravity when an object is falling through water. If the upthrust is less than the weight of the object, the object will sink. If the upthrust is equal to the weight of the object, the object will float. Some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	**Electricity** Electricity involves the movement of electric charge through a circuit. This movement is driven by an electrical force from the power source (battery or cell). The electrical force pushes electrons through wires and components. The flow of electricity causes changes in components — for example, lighting a bulb or turning a motor. The motor converts electrical energy into kinetic energy, causing motion. The buzzer converts electrical energy into sound energy through vibration. The brightness of a bulb or loudness of a buzzer depends on the strength of the electrical force, which is affected by the number of cells and the resistance in the circuit. Switches control the flow of electricity by opening or closing the circuit, which either allows or stops the force from acting. The structure of the circuit determines how efficiently electrical energy is transferred and used. **Light** Light travels in straight lines from a source and can be reflected, absorbed or refracted. When light hits a surface, it exerts a small force that can be measured in sensitive instruments (though

				<u>Space</u> The Earth is held in orbit around the Sun by the force of gravity. The Moon is held in orbit around the Earth by gravity. Gravity is a non-contact force that acts between objects with mass. The Sun's gravitational pull keeps the planets in the solar system moving in curved paths. The Earth's rotation causes day and night. The tilt of the Earth and its orbit around the Sun cause seasonal changes. The Moon's orbit around the Earth causes the phases of the Moon. Objects in space move due to gravitational forces acting on them. Astronauts experience microgravity in space because the pull of gravity is much weaker. Weight is the force of gravity acting on mass. The strength of gravity depends on the mass of the object and the distance between them.	not directly taught at this stage). Light energy can cause physical changes. For example, heating a surface or triggering a sensor. Reflected light changes direction when it bounces off a surface. Refraction bends light as it moves between materials, changing its path. Shadows are formed when light is blocked by an object. The shape and size of the shadow depend on the position of the light source and the object. The movement of light and its interaction with surfaces involve directional changes that relate to motion and force.

The Progression in Disciplinary Knowledge (Skills in Working Scientifically)

Working Scientifically A key component of the National Curriculum is the development of children's awareness of and fluency with the nature, processes and methods of science – in other words, 'being scientists'. Skills in working scientifically are taught explicitly through different types of science enquiries that help children to answer scientific questions about the world around them.		**EYFS**	**KS1**	**Lower KS2**	**Upper KS2**
	2. Experimental and design skills 	*Pupils will…* Use a range of small tools, including scissors, paint brushes and cutlery (ELG: Fine Motor Skills) Safely use a range of tools, objects, construction and malleable materials (ELG: Creating with Materials) Invent, adapt and recount narratives and stories with peers and their teacher (ELG: Speaking) Explore the natural world around them, making observations and drawing pictures of animals and plants (ELG: The Natural World) Share their creations, explaining the process they have used (ELG: Creating with Materials) Combine different materials to create new effects (ELG: Creating with Materials) Work and play cooperatively and take turns with others (ELG: Building Relationships)	*Pupils will…* • explore the world around them and raise questions • begin to recognise ways in which they might answer scientific questions • use simple features to compare objects, materials and living things and with help, decide how to sort and group them • observe changes over time • record simple data • use simple secondary sources to find answers • take simple measurements and use simple equipment (for example, hand lenses, egg timers) to gather data	*Pupils will…* • ask relevant questions and use a variety of experimental designs to gather evidence to answer them, suggesting different types of enquiry • recognise ways in which their questions can be answered and begin to identify the most appropriate • set up simple practical enquiries, comparative and fair tests • make careful observations and take accurate measurements using a range of equipment and standard units	*Pupils will…* • select and plan the most appropriate type of scientific enquiry to use to answer relevant questions linked to the topic • recognise the independent and dependent variable and control other variables where necessary • make decisions about which equipment to use and the most appropriate measurements to use • take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • recognise which secondary sources will be most useful to research their ideas
	3. Analysis and evaluation of results 	*Pupils will…* Make comments about what they have heard and ask questions to clarify their understanding (ELG: Listening, Attention and Understanding) Explain the reasons for rules, know right from wrong and try to behave accordingly (ELG: Managing Self) Describe events in some detail (ELG: Speaking) Make comments about what they have heard and ask questions to clarify their understanding (ELG: Listening, Attention and Understanding) Explore the natural world around them, making observations and drawing pictures of animals and plants (ELG: The Natural World)	*Pupils will…* • with help, begin to notice patterns and relationships and link these to scientific ideas • talk about what they have found out and how they found it out • talk about elements of their enquiry that did not go to plan	*Pupils will…* • identify differences, similarities and changes related to simple scientific ideas • interpret their data to generate simple comparative statements and conclusions based on their evidence • begin to identify naturally occurring patterns and causal relationships • identify how they might change their method if they did the inquiry again	*Pupils will…* • answer their own and others' questions based on the data they have collected and discuss whether other evidence (e.g. from other pupil groups or secondary sources) supports or refutes their answer • identify results that do not fit the overall pattern and suggest why these may have arisen • evaluate their experimental design, identifying any limitations that reduce the trust they have in their data and suggesting improvements should they undertake the inquiry again • talk about how their scientific ideas have changed due to the new evidence they have gathered, and how new discoveries have changed scientific understanding over time

		Explore the natural world around them, making observations and drawing pictures of animals and plants (ELG: The Natural World)			
	4. Scientific oracy and literacy 	*Pupils will…* Participate in small group, class and one-to-one discussion, offering their own ideas, using recently introduced vocabulary (ELG: Listening, Attention and Understanding) Express their ideas and feelings about their experiences using full sentences, including use of past, present and future tenses, and making use of conjunctions, with modelling and support from their teacher (ELG: Speaking) Say a sound for each letter in the alphabet and at least 10 digraphs (ELG: Word Reading) Write simple phrases and sentences that can be read by others (ELG: Writing) Use and understand recently introduced vocabulary during discussions about stories, non-fiction, rhymes and poems and during role-play (ELG: Comprehension)	*Pupils will…* • with help, record and communicate their findings in a range of ways • use and pronounce scientific (Tier 2 & 3) vocabulary accurately during discussions • read and spell correctly scientific (Tier 2 & 3) vocabulary • begin to decide for themselves how to present evidence	*Pupils will…* • gather, classify and and present their evidence in a variety of ways, including drawings, diagrams, charts and tables • begin to decide for themselves how to present evidence • use and pronounce scientific (Tier 2 & 3) vocabulary accurately during discussions • read and spell correctly scientific (Tier 2 & 3) vocabulary	Pupils will… • report and present findings from enquiries, including conclusions, causal relationships, explanations of and degree of trust in results, in oral and written forms • choose appropriate means of presenting their findings • use and pronounce scientific (Tier 2 & 3) vocabulary consistently accurately during discussions • read and consistently spell correctly scientific (Tier 2 & 3) vocabulary