## Science Whole School Knowledge and Skills Overview

### Intent

It is our intention at St Mary and Joseph's to instil in all young people a lifelong curiosity and interest in the sciences. We intend for children to have the opportunity, wherever possible, to learn through varied systematic investigations with quality resources, leading to them being equipped to ask and answer scientific questions about the world around them. As children progress through the year groups, they build on their skills in working scientifically, as well as on their scientific knowledge, as they develop greater independence in planning and carrying out fair and comparative tests to answer a range of scientific questions. At St Mary and St Joseph's we use a knowledge organiser with each unit that can be used to help reinforce the key knowledge as set out in the science national curriculum. The knowledge organisers help children to consolidate and retain the science knowledge they have learnt and also reinforce key scientific vocabulary from each unit. We ensure that children have a varied, progressive and well-mapped-out science curriculum that provides the opportunity for progression across the full breadth of the science national curriculum for KS1 and KS2. Most units are taught thematically to create wider connections with other subjects and the local context. We intend that children understand the uses and implications of science, and linked STEM careers, now and in the future.

### Implementation

A love of science is nurtured at our school and children are encouraged to ask questions. The acquisition of key scientific knowledge and conceptual understanding is an integral part of every science lesson. Linked knowledge organisers enable children to learn and retain the important, useful and powerful vocabulary and knowledge contained within each unit. The progression of skills for working scientifically are developed through the year groups and scientific enquiry skills are of key importance within lessons. The progression of these skills is set out in the Science Progression Map. Each lesson has a clear focus. Scientific knowledge and enquiry skills are developed with increasing depth and challenge as children move through the year groups. They complete investigations and hands-on activities while gaining the scientific knowledge for each unit. Interwoven through each lesson are key questions to assess the children's levels of understanding and to review concepts where necessary. The sequence of lessons helps to embed scientific knowledge and skills, with each lesson building on previous learning. Activities are effectively scaffolded so that all children have an appropriate level of support and challenge. At St Mary and St Joseph's we ensure teachers are equipped with secure scientific subject knowledge, enabling them to deliver high-quality teaching and learning opportunities while being aware of possible scientific misconceptions.

### Impact

At St Mary and St Joseph's, progress is measured through a child's ability to know more, remember more and explain more. The use of questioning ensures opportunities are built into the lesson for ongoing assessment. Attainment and progress can be measured across the school using end of unit assessment questions and activities. The learning environment across the school is consistent with science technical vocabulary displayed, spoken and used by all learners. The impact of our science curriculum and teaching will be children who feel confident in their science knowledge and enquiry skills and are excited about science, show that they are actively curious to learn more and will see the relevance of what they learn in science lessons to real-life situations and also the importance of science in the real world.

**Whole School Science Overview**

| | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
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| Reception<br>THE NATURAL WORLD | **Weather and Seasons**<br>Understand some important changes in the natural world: Seasons | **Materials and States of Matter**<br>Understand some important changes in states of matter<br><br>**Animals and Humans**<br>Explore how we have grown and changed since we were born | **Weather and Seasons**<br>Understand some important changes in the natural world: Seasons<br><br>**Living Things and Habitats**<br>Know some similarities and differences between the natural world around them and contrasting environments | **Materials and States of Matter**<br>Understand some important changes in states of matter<br><br>**Weather and Seasons**<br>Understand some important changes in the natural world: Seasons<br><br>**Living Things and Habitats**<br>Explore the natural world around them, making observations and drawing pictures of animals and plants | **Living Things and Habitats**<br>Explore the natural world around them, making observations and drawing pictures of animals and plants | **Weather and Seasons**<br>Understand some important changes in the natural world: Seasons<br><br>**Living Things and Habitats**<br>Know some similarities and differences between the world around them and contrasting environments |
| Year 1 | Animals including Humans | | Materials | Seasonal Changes | Plants | |
| Year 2 | Use of Everyday Materials | | Living Things and their Habitats | | Plants | Animals, including humans |
| Year 3 | Light and Shadow | Animals, including Humans (Rattle Those Bones topic) | Animals, including Humans (Predator topic) | Plants | Rocks | |
| Year 4 | States of Matter | Animals, including humans (Burps, Bottoms and Bile topic) | Sound | States of Matter:<br>The Water Cycle | Electricity | Living Things and their Habitats (Blue Abyss) |
| Year 5 | Everyday Materials: Properties and changes of Materials | | Earth and Space | Living Things and their Habitats | Animals, including humans | Forces |
| Year 6 | Light | Animals, including humans (Blood Heart Topic) | Living Things and their Habitats | Evolution and Inheritance (ID Topic) | Electricity | |

**Working Scientifically – Disciplinary Knowledge**
**As Scientists we:**

| | Reception | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
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| **Answering and answering questions** | Know questions are used to ask for information | Use everyday language/begin to use simple scientific words to ask or answer a scientific question. | Suggest ideas, ask simple questions and know that they can be answered/investigated in different ways including simple secondary sources such as books/video clips. | Use ideas to pose questions, independently about the world around them. | Suggest relevant questions and know that they could be answered in a variety of ways including using secondary sources such as ICT. Answer questions using straight forward scientific evidence. | Raise different types of scientific questions and hypotheses. | Pose/select the most appropriate line of enquiry to investigate scientific questions. |
| **Investigating** | Know that a test is a set of tasks | Follow instructions to complete a simple test individually or in a group. | Do things in the correct order when performing a simple test and begin to recognise when something is unfair. | Discuss enquiry methods and describe a fair test. | Make decisions about different enquiries including recognising when a fair test is necessary and begin to identify variables. | Plan a range of science enquiries including comparative and fair tests. | Select and plan the most suitable line of enquiry, explaining which variables need to be controlled and why in a variety of comparative and fair tests. |
| **Observing** | Talk about what we see is happening and changing | Observe objects materials and living things and describe what they see. | Observe something closely and describe changes over time. | Make decisions about what to observe during an investigate. | Make systematic and careful observations. | Plan and carry out comparative and fair tests making systematic and careful observations. | Make their own decisions about which observations to make using test results and observations to make predictions or set up further comparative or fair tests. |
| **Equipment and measuring** | Use simple equipment in practical tasks | Use simple, non-standard measurements in a practical task. | Use simple equipment such as hand lenses or egg timer to take measurements, make observations and carry out simple tests. | Take accurate measurements using standard units. | Take accurate measurements using standard units and a range of equipment, including thermometers and dataloggers. | Take measurements using a range of scientific equipment with increasing accuracy and precision. | Choose the most appropriate equipment in order to take measurements, explaining how to use it accurately. Decide how long to take measurements for, checking results with additional readings. |
| **Identifying and classifying** | Compare and group objects and materials according to simple given criteria. | Sort and group objects, materials and living things with help, according to simple observational features. | Decide, with help, how to group materials, living things and objects, noticing changes over time and beginning to see patterns. | Talk about criteria for grouping, sorting and categorising, beginning to see patterns and relationships. | Identify similarities/differences/ changes when talking about scientific processes. | Use and develop keys to identify classify and describe living things and materials. | Identify and explain patterns seen in the natural environment. |

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| | | | | | Use and begin to create simple keys. | | |
| **Recording and reporting on findings** | Observe, record and talk about materials and living things | Talk about their findings and explain what they have found out. | Gather data, record and talk about their findings in a range of ways using simple scientific vocabulary. | Record their findings using scientific language and present in note form, writing frame, diagrams, tables and charts. | Choose appropriate ways to record and present information, findings and conclusions for different audiences e.g. displays, oral or written explanations. | Record data and results of increasing complexity using scientific diagrams, labels, classification keys, tables, bar and line graphs and model. | Choose the most effective approach to record and report results linking to mathematical knowledge. |
| **Analysing data** | Ask a relevant scientific question to find out more, explain how things work and why they might happen. | Use every day or simple scientific language to ask and or answer a question on given data. | Identify simple patterns and/or relationships using simple comparative language. | Gather record and use data in a variety of ways to answer a simple question. | Identify, with help, changes, patterns, similarities and differences in data to help form conclusions. Use scientific evidence to support their findings. | Use relevant scientific language and illustrations to discuss communicate and justify their scientific ideas. | Identify and explain causal relationships in data and identify evidence that supports or refutes their findings, selecting fact from opinion. |

**Knowledge Progression – Substantive Knowledge**

| Year group | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
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| Reception: Understanding the World | **<u>Weather and Seasons</u>**<br>**Understand some important changes in the natural world: Seasons**<br>-To explore the natural world around them<br>-To observe features of Autumn during a walk<br>-To describe what they, see, hear and feel whilst outside<br>-To understand the effect of changing seasons on the natural world around them | **<u>Materials and States of Matter</u>**<br>**Understand some important processes and changes in states of matter**<br>-To observe and describe changes to materials when making hedgehog rolls<br><br>**<u>Animals and Humans</u>**<br>**Explore how we have grown and changed since we were born**<br>-To know basic structure of their own body and use 5 senses<br>-To know that their bodies are made up of different parts<br>-To explore using their senses | **<u>Weather and Seasons</u>**<br>**Understand some important changes in the natural world: Seasons**<br>**Know some similarities and differences between the natural world around them and contrasting environments**<br>-To explore the natural world around them<br>-To observe features of Winter during a walk<br>-To describe what they, see, hear and feel whilst outside<br>-To understand the effect of changing seasons on the natural world around them<br>-To name some polar animals<br>-To describe Polar environments and explain how it is different to our environment<br><br>**<u>Materials and States of Matter</u>**<br>**Understand some important processes and changes in states of matter**<br>-To observe and describe changes to ice<br>-To explore materials for keeping warm and waterproof | **<u>Materials and States of Matter</u>**<br>**Understand some important changes in states of matter**<br>- To observe and describe changes to materials when making gingerbread men and Easter nests<br><br>**<u>Weather and Seasons</u>**<br>**Understand some important changes in the natural world: Seasons**<br>-To explore the natural world around them<br>-To observe features of Spring during a walk<br>-To describe what they, see, hear and feel whilst outside<br>-To understand the effect of changing seasons on the natural world around them<br><br>**<u>Animals and Humans</u>**<br>**Explore the natural world around them, making observations and drawing pictures of animals and plants**<br>-To observe and describe the life of a chick | **<u>Animals and Humans / Living Things are their Habitats</u>**<br>**Explore the natural world around them, making observations and drawing pictures of animals and plants**<br>**Explore how plants / animals grow and change**<br>-To know a living thing has a life cycle: Caterpillars/butterflies<br>-To know a living thing grows and changes; it doesn't always look the same<br>-To know plants grow from seeds<br>-To know how to plant plants carefully<br>-To name the parts of a plant and learn about the life cycle of a sunflower<br>-To know that living things live in different habitats: create a bug hotel | **<u>Weather and Seasons</u>**<br>**Understand some important changes in the natural world: Seasons**<br>-To explore the natural world around them<br>-To observe features of Summer during a walk<br>-To describe what they, see, hear and feel whilst outside<br>-To understand the effect of changing seasons on the natural world around them<br><br>**<u>Forces and Magnets</u>**<br>**Explore that some things float and sink**<br>-To investigate how objects can behave differently in water<br>-To observe and compare how materials behave in water |

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| Year 1 | **Animals, Including Humans**<br>**Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.**<br>-To know animals are living things can be sorted and grouped according to common characteristics: birds have 2 legs, a beak and feathers<br>Fish have scales, fins and breathe using gills<br>Reptiles have dry scaly skin<br>**Identify and name a variety of common animals that are carnivores, herbivores and omnivores.**<br>-To know carnivores eat (other animals), herbivores eat plants and omnivores eat both meat and plants<br>- To know carnivores have features to help them hunt: eyes at front of head, sharp teeth<br>-To know herbivores have features to help them eat plants and keep safe from other animals: eyes on side of head, flat, sharp teeth<br>-To know omnivores have features of both carnivores and herbivores<br>**Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets).**<br>-To know that different animal groups have some common body parts: eyes, mouth and some different body parts: scales, wings, fins, beaks, fur | **Animals Including, Humans**<br>**Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.**<br>-To know the parts of the body: head, arms, elbow, shoulder, legs, knee, ankle, eyes, nose, ears, mouth<br>-To know and name the 5 senses and which body parts are used for each sense<br><br>**Investigation / Experiment Opportunities**<br>-Investigate how the size of forearm is linked to length of foot<br>-Identifying objects from senses: Senses Test | **Materials**<br>**Distinguish between an object and the material from which it is made.**<br>-To know which materials are used to make objects around us<br>**Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.**<br>- To know materials can be used to make a range of objects<br>- To know the same material can be used to make different objects: plastic can be used to make chairs, straws, containers<br>**Describe the simple physical properties of a variety of everyday materials.**<br>-To know that we can use our sense of touch to describe materials<br>-To know that that the feel of an object is its texture<br>-To know what materials are used to make house and why<br>-To know what makes a good insulator<br>**Compare and group together a variety of everyday materials on the basis of their simple physical properties.**<br>-To know the properties of different materials: hard, soft, brittle, strong, transparent | **Seasonal Changes**<br>**Observe changes across the 4 seasons**<br>-To know there are four seasons: spring, summer, autumn and winter. Certain events and weather patterns happen in different seasons.<br>-To know the local environment is a habitat for living things and can change during the seasons.<br>**Observe and describe weather associated with the seasons and how day length varies**<br>-To know day length (the number of daylight hours) is longer in the summer months and shorter in the winter months.<br>-To know different types of weather include sunshine, rain, hail, wind, snow, fog, lightning, storm and cloud. The weather can change daily and some weather types are more common in certain seasons, such as snow in winter: measure and record the wind/temperature/rainfall<br><br>*Throughout year take photos of the same tree in the school environment for children to observe and use in this unit*<br><br>**Investigation / Experiment Opportunities**<br>-investigate how temperature changes over a day | **Plants**<br>**Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.**<br>-To know plants are living things.<br>-To know common plants include the daisy, daffodil and grass.<br>-To know that trees are large, woody plants and are either evergreen or deciduous. Trees that lose their leaves in the autumn are called deciduous trees: oak, beech and rowan. Trees that shed old leaves and grow new leaves all year round are called evergreen trees: holly and pine.<br>**Identify and describe the basic structure of a variety of common flowering plants, including trees.**<br>- To know the basic plant parts include root, stem, leaf, flower, petal, fruit, seed and bulb.<br>-To know plants change over time as they grow and mature<br>- To know in winter, many plants and trees are dormant and have buds on their branches. In spring, leaves and blossom appear on trees and smaller plants begin to grow and flower.<br>-To know trees have a woody stem called a trunk.<br>-To know the parts of a leaf include the margin, blade, veins and stalk. Leaves can be simple, palmate, compound, lobed or needle-like.<br><br>**Investigation / Experiment Opportunities**<br>-Identify and classify range of seeds and bulbs<br>-Plant and observe a chosen plant and how it changes over time |

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| | **Investigation / Experiment Opportunities**<br>-Observe body parts of animals using a magnifying glass | | **Investigation / Experiment Opportunities**<br>-Testing materials to find the best for insulation<br>-Test absorbency of kitchen towels | -investigate wind speed / rainfall over a period of days | | |
| Year 2 | **Use of Everyday Materials**<br>**Compare and group together a variety of everyday materials on the basis of their simple physical properties**<br>-To know the physical properties of everyday materials<br>-To know that properties we might use are: brittle, tough, opaque, malleable, reflective<br>-To know and name natural or man-made materials<br>**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>-To know objects are made from different materials<br>-To know the same object can be made from different materials<br>-To know materials are chosen for a purpose because of their properties<br>-To know that before materials are chosen for a purpose they must be tested first<br>**Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching**<br>-To know that a solid is a shape that stays the same unless it is squashed, bent, twisted or stretched.<br><br>**Investigation / Experiment Opportunities**<br>-Testing strength of paper<br>-Testing different straws to find which suits purpose the best<br>-Predicting and testing which material is best for keeping things cool<br>-Investigate which solids can be changed by squashing, bending, twisting and stretching<br>-Test how materials can be mixed to make it waterproof | | **Living Things and their Habitats**<br>**Explore and compare the differences between things that are living, dead, and things that have never been alive.**<br>-To know that things that are living grow, eat and breathe<br>-To know that all living things do not eat and breathe in the same way as humans<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>-To know habitats are places where animals and plants live<br>-To know there are different habitats throughout the world: pond, woodland, desert, rainforest, ocean<br>-To know habitats provide shelter, water, food and space<br>**Identify and name a variety of plants and animals in their habitats, including microhabitats.**<br>- To know different animals have different needs and physical features that mean they are suited to certain habitats.<br>-To describe what a microhabitat is and what lives there<br>**Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.**<br>-To know that different animals eat different types of food<br><br>**Investigation / Experiment Opportunities**<br>-Investigate what minibeasts are found in the microhabitats of local habitats<br>-Observe and record how habitats change over time | | **Plant Knowledge**<br>**Observe and describe how seeds and bulbs grow into mature plants.**<br>- To know that plants grow from seeds and bulbs. Seeds and bulbs need water and warmth to start growing (germinate). As the plant grows bigger, it develops leaves and flowers.<br>- To know different plants grow in different habitats and change with the seasons.<br>-To know plants have roots, stems, leaves, flowers and fruit. Trees have roots, a trunk, bark, branches and leaves.<br>-To know a bulb contains a tiny plant and all the food needed to grow. Spring bulbs can start to grow in winter when the ground is frozen.<br>-To know the flowers of plants produce seeds. The flowers on some plants develop into fruit that contains seeds.<br>**Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.**<br>-To know plants need water, light and a suitable | **Animals, including humans**<br>**Notice that animals, including humans, have offspring which grow into adults.**<br>-To know that animals have offspring which grow into adults<br>-To know some animals have live births and other animals lay eggs<br>-To know all animals go through stages of growth and stop growing at some point<br>-To know how a frog develops<br>**Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).**<br>-To know that all animals have 3 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.**<br>-To know that a balanced diet, water, exercise, sleep and good hygiene are important<br>-To know why exercise is good for your body and well-being |

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| | | | | | temperature to grow and stay healthy. Without any one of these things, they will die<br><br>**Investigation / Experiment Opportunities**<br>-Seed germination investigation<br>-Investigate what grass needs to grow | **Investigation / Experiment Opportunities**<br>-Observe how a frog develops from spawn<br>-Investigate why soap works (pepper test)<br>-Explore the effect of different types of exercise on pulse rate |
| Year 3 | **Light and Shadows**<br>**Recognise that they need light in order to see things and that dark is the absence of light.**<br>-To know that light is a form of energy that travels in a wave<br>-To know that a light source produces light<br>-To know darkness is the absence of light<br>-To know light travels in a straight line<br>**Notice that light is reflected from surfaces.**<br>- To know a reflector reflects light. Light sources and reflectors can be natural, such as the Sun and Moon, or artificial, such as a light bulb or bike reflector.<br>- To know light can be reflected from different surfaces. Some surfaces are poor reflectors, such as some fabrics, while other surfaces are good reflectors, such as mirrors<br>-To know reflective materials are light in colour, shiny and smooth. Non-reflective materials are dark in colour, dull and rough. | **Animals, including humans**<br>**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>-To know humans have to get nutrition from what they eat.<br>-To know it is important to have a balanced diet made up of the main food groups, including proteins, carbohydrates, fruit and vegetables, dairy products and alternatives, and fats and spreads and that humans need to stay hydrated by drinking water.<br>**Identify that humans and some other animals have skeletons and muscles for support, protection and movement.**<br>-To know that humans have a skeleton and muscles for movement, support and protecting organs. Major bones in the human body include the skull, ribs, spine, | **Animals, including humans**<br>**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>-To know animals cannot make their own food and need to get nutrition from the food they eat. Carnivores get their nutrition from eating other animals. Herbivores get their nutrition from plants. Omnivores get their nutrition from eating a combination of both plants and other animals.<br><br>**Identify that humans and some other animals have skeletons and muscles for support, protection and movement.**<br>-To know some animals have skeletons for support, movement and protection. Endoskeletons are those found inside some animals, such as humans, cats and | **Plants**<br>**Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.**<br>-To know that the plant's roots anchor the plant in the ground and transport water and minerals from the ground to the plant.<br>-To know that the stem (or trunk) support the plant above the ground.<br>-To know that the leaves collect energy from the Sun and make food for the plant.<br>-To know that flowers make seeds to produce new plants.<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>-To know that plants need air, light, water, minerals from the soil and room to grow, in order to survive. | **Rocks**<br>**Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.**<br>-To know there are three different rock types: sedimentary, igneous and metamorphic.<br>-To know how the different rock types are formed<br>**Describe in simple terms how fossils are formed when things that have lived are trapped within rock.**<br>-To know that fossils form over millions of years and are the remains of a once-living organism, preserved as rock. -To know scientists can use fossils to find out what life on Earth was like in prehistoric times.<br>-To know fossils form when a living thing dies in a watery environment. The body gets covered by | **Forces and Magnets**<br>**Compare how things move on different surfaces.**<br>-To know that a force is what causes an object to move<br>-To know the effects of 2 surfaces rubbing together<br>-To know friction is the force that acts to slow an object down<br>-To know smooth surfaces generate less friction than rough surfaces<br>**Notice that some forces need contact between two objects, but magnetic forces can act at a distance.**<br>-To know an object will not move unless a pushing or pulling force is applied.<br>-To know some forces require direct contact, whereas other forces can act at a distance, such as magnetic force.<br>**Observe how magnets attract or repel each** |

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| | **Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.**<br>-To know light from the sun is damaging for vision and the skin. Protection from the Sun includes sun cream, sun hats, sunglasses and staying indoors or in the shade<br>**Recognise that shadows are formed when the light from a light source is blocked by an opaque object.**<br>-To know a shadow is made when an object blocks the passage of light from a light source. A shadow is the same shape as the object that casts it because light travels in straight lines. Shadows always appear on the opposite side of the light source.<br>-To know the terms: opaque, translucent, transparent<br>**Find patterns in the way that the size of shadows change.**<br>-To know shadows change when the light source or the object moves. For example, when a light source is lowered, shadows grow longer.<br><br>**Investigation / Experiment Opportunities**<br>-Investigate reflective materials<br>-Investigate if all objects create shadows<br>-Observe shadows on a sunny day and how they change | humerus, ulna, radius, pelvis, femur, tibia and fibula.<br>-To know the major muscle groups in the human body include the biceps, triceps, abdominals, trapezius, gluteals, hamstrings, quadriceps, deltoids, gastrocnemius, latissimus dorsi and pectorals.<br>-To know a joint is where two or more bones meet and connect<br>-To know the 3 main types of joints: hinge, ball and socket and pivot<br><br>**Investigation / Experiment Opportunities**<br>-Investigating fatty foods<br>-Investigate and test if length of femur effects how far we jump | horses. Exoskeletons are those found on the outside of some animals, such as beetles and flies. Some animals have no skeleton, such as slugs and jellyfish.<br><br>**Investigation / Experiment Opportunities**<br>-Owl pellet dissection<br>-Extreme Falconry visit | -To know different plants have different needs depending on their habitat: ferns, cacti<br>**Investigate the way in which water is transported within plants.**<br>-To know water is transported in plants from the roots, through the stem and to the leaves, through tiny tubes called xylem.<br>-To know leaves have two main functions. They capture energy from sunlight to make food through the process of photosynthesis, and they lose water in a process called transpiration, which causes water and nutrients to enter the root and move through the plant. The structure, shape, size and position of leaves help them carry out these functions.<br>**Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.**<br>-To know flowers are important in the life cycle of flowering plants.<br>-To know the processes of a plant's life cycle include germination, flower production, pollination, seed formation and seed dispersal.<br>-To know insects and the wind can transfer pollen from one plant to another (pollination). | mud and sand and the soft tissues rot away. Over time, the ground hardens to form sedimentary rock and the skeletal or shell remains turn to rock.<br>**Recognise that soils are made from rocks and organic matter.**<br>-To know soils are made from tiny pieces of eroded rock, air and organic matter.<br>-To know there are a variety of naturally occurring soils, including clay, sand and silt.<br>-To know different areas have different soil types.<br><br>**Investigation / Experiment Opportunities**<br>-Investigate different types of soil | **other and attract some materials and not others.**<br>-To know magnets have different strengths<br>-To know some materials have magnetic properties.<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>-To know all magnetic materials are metals but not all metals are magnetic.<br>-To know iron. cobalt, nickel and steel are magnetic metals.<br>**Describe magnets as having two poles.**<br>-To know magnets have two poles (north and south).<br>**Predict whether two magnets will attract or repel each other, depending on which poles are facing.**<br>-To know opposite poles (north and south) attract each other, while like poles (north and north, or south and south) repel each other.<br><br>**Investigation / Experiment Opportunities**<br>-Investigate frictional forces between a shoe and different surfaces |

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| | | | | -To know animals, wind, water and explosions can disperse seeds away from the parent plant (seed dispersal).<br><br>**Investigation / Experiment Opportunities**<br>-Observe and record what happens when celery stick in coloured water<br>-Plan and carry out a fair test: What happens to a plant if…? | | -Magnetic strength investigation |
| Year 4 | **States of Matter**<br>**Compare and group materials together, according to whether they are solids, liquids or gases.**<br>-To know that all states of matter are made up of particles which have energy and move<br>-To define what a solid, liquid and gas is<br>-To know liquids with a high water content will travel faster than those with a low water content.<br>**Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)**<br>-To know when a solid is heated it gains energy, the particles | **Animals, including humans**<br>**Describe the simple functions of the basic parts of the digestive system in humans.**<br>-To know the names of the organs involved in the digestive process: oesophagus, stomach, large and small intestine and anus<br>- To know how the food we eat affects their digestive process<br>- To know how the digestive system of humans compares with other animals<br>**Identify the different types of teeth in humans and their simple functions.**<br>-To know there are four different types of teeth: incisors, canines, premolars and molars. Incisors are used for cutting. Canines | **Sound**<br>**Identify how sounds are made, associating some of them with something vibrating.**<br>-To know sounds are made when objects vibrate.<br>-To know sound is a form of energy<br>**Recognise that vibrations from sounds travel through a medium to the ear.**<br>-To know sound can travel through different objects<br><br>**Find patterns between the pitch of a sound and features of the object that produced it.**<br>-To know how to change the pitch of a sound<br>-To know the pitch of a sound is due to the frequency of the vibration | **States of Matter**<br>**Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.**<br>-To know and explain what happens to water when it is heated<br>-To know what the water cycle is and how it works<br>-To know the water cycle has four stages: evaporation, condensation, precipitation and collection.<br>-To know that water in lakes, rivers and streams is warmed by the Sun, causing the water to evaporate and rise into the air as water vapour. As the water vapour rises, it cools and condenses | **Electricity**<br>**Identify common appliances that run on electricity.**<br>-To know electricity is a type of energy. It is used to power many everyday items, such as kettles, computers and televisions. -To know electricity comes from 2 sources: mains and batteries<br>**Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.**<br>-To know a circuit is a collection of components connected by wires | **Living Things and their Habitats**<br>**Recognise that living things can be grouped in a variety of ways.**<br>-To know scientists classify living things according to shared characteristics.<br>-To know animals can be divided into six main groups: mammals, reptiles, amphibians, birds, fish and invertebrates. These groups can be further subdivided.<br>-To know invertebrates usually have soft bodies or a hard outer shell or covering called an exoskeleton. There are six main groups of invertebrates: annelids, |

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| | move more and it changes to a liquid state (melting)<br>-To know some solids will freeze and solidify<br><br>**Investigation / Experiment Opportunities**<br>-Investigate which liquid moves faster<br>-Observe and measure the rate at which different solids melt<br>-Predict and test which liquids will freeze | are used for tearing. Premolars and molars are used for grinding and chewing.<br>-To know carnivores, herbivores and omnivores have characteristic types of teeth. Herbivores have many large molars for grinding plant material. Carnivores have large canines for killing their prey and tearing meat.<br>-To know sugar is bad for teeth and can lead to future problems<br>-To know why it is important to brush our teeth<br><br>**Investigation / Experiment Opportunities**<br>-Investigate the effect on enamel (egg shell) from different liquids<br>-Toothpaste investigation testing effectiveness in preventing tooth decay | **Find patterns between the volume of a sound and the strength of the vibrations that produced it.**<br>-To know the larger the vibration the larger the amplitude, the louder the sound.<br>-To know the weaker the vibration, the lower the amplitude and the smaller the sound wave<br><br>**Recognise that sounds get fainter as the distance from the sound source increases.**<br>-To know the further the distance between the sound source and your ear, the fainter the sound becomes.<br>-To know that distance affects sound waves<br>-To know that strong sound waves travel further than weak sound waves<br><br>**Investigation / Experiment Opportunities**<br>-Muffling sound investigation<br>-Plan and investigate: 'How does the volume of a sound change as you move away from a sound source?' | to form water droplets in clouds. The clouds become full of water until the water falls back to the ground as precipitation (rain, hail, snow and ice). The fallen water collects back in lakes, rivers and streams.<br>-To know evaporation and condensation are caused by temperature changes.<br><br>**Investigation / Experiment Opportunities**<br>-Investigate what happens when water heated up | through which an electric current can flow.<br>-To know a circuit must be a complete loop to work.<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>-To know a series circuit is a simple loop with only one path for the electricity to flow<br>-To know a series circuit must be a complete loop to work and have a source of power from a battery or cell.<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>- To know a switch makes or breaks a circuit. When a switch is closed or 'on', the circuit is complete. When a switch is open or 'off', the circuit is incomplete.<br>**Recognise some common conductors and insulators, and associate metals with being good conductors**<br>-To know electrical conductors allow electricity to flow through them, whereas insulators do not. | molluscs, arachnids, crustaceans, insects and myriapods.<br>-To know there are many different ways to group plants: flowering / non-flowering, deciduous / evergreen<br>**Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.**<br>-To know classification keys are scientific tools that aid the identification of living things.<br>-To know classification keys are created by devising a set of yes or no questions that separate a group into two groups until objects end up on their own. Classification keys are also called dichotomous keys or branching trees.<br>**Recognise that environments can change and that this can sometimes pose dangers to living things.**<br>-To know an environment can affect animals and plants positively and negatively.<br>-To know many factors can affect the survival of plants and animals: - Climate change, seasonal changes, changes in the environment, people, the weather. |

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| | | | | | -To know common electrical conductors are metals.<br>-To know common insulators include wood, glass, plastic and rubber.<br><br>**Investigation / Experiment Opportunities**<br>-Investigating conductive and non-conductive materials | **Animals, including humans**<br>**Construct and interpret a variety of food chains, identifying producers, predators and prey.**<br>-To know food chains show what animals eat within a habitat and how energy is passed on over time.<br>-To know all food chains start with a producer, which is typically a green plant. The producer is eaten by a primary consumer (prey), which is eaten by a secondary consumer (prey), which is eaten by a tertiary consumer. All food chains end with a top or apex predator.<br>-To know changes within a food chain, such as an abundance or lack of one food type, have an impact on the entire food chain.<br><br>**Investigation / Experiment Opportunities**<br>-create a plant classification key |
| Year 5 | **Properties and changes of materials**<br>**Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.**<br>To know different materials have different properties.<br>To know that materials' properties makes them suitable for specific purposes.<br>To know thermal conductors conduct heat. | | **Earth and Space**<br>**Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.**<br>To know the solar system is a collection of 9 planets and their moons in orbit around the sun. | **Living Things and their Habitats**<br>**Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.**<br>To know that most animals including mammals, fish, | **Animals, including Humans**<br>**Describe the changes as humans develop to old age.**<br>To know the stages of human development – baby, toddler, child, | **Forces**<br>**Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.** |

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| | To know solids, such as plastic, wood and glass do not conduct heat. They are thermal insulators.<br>**Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.**<br>To know solubility is a measure of a material's ability to dissolve in a solvent. A material is soluble if it can dissolve in a solvent to form a solution.<br>To know a material is insoluble if it cannot be dissolved in a solvent to form a solution.<br>To know dissolving is when a solute becomes incorporated into a solvent and can no longer be seen.<br>**Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.**<br>To know sieving can be used to separate large solids from liquids and some solids from other solids. To know filtering can be used to separate small solids from liquids.<br>To know evaporating can be used to separate dissolved solids from liquids.<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>To know reversible changes include heating, cooling, melting, dissolving and evaporating.<br>**Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.**<br>To know irreversible changes include burning, rusting, decaying and chemical reactions.<br>To know irreversible changes are usually accompanied by one or more of these signs: a gas is produced; light is produced; a smell is produced or the smell changes; the colour changes; sound is produced, or the temperature changes.<br><br>**Investigation / Experiment Opportunities**<br>- Test properties of materials<br>- Plan an investigation based on question generated from knowledge, e.g. Do all metals rust? How much salt can be dissolved in 100ml of water? Is the saturation point different if the solvent is hot or cold? | To know the order of the planets from the sun is Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto.<br>To know that Earth rotates on an axis at a tilt at the same time orbiting around the sun.<br>To know that the sun is in the centre of our solar centre.<br>To know that orbit is a path an object takes in space when it goes around a star, planet or a moon.<br>**Describe the movement of the Moon relative to the Earth**<br>To know the moon orbits around the Earth and rotates<br>**Describe the Sun, Earth and Moon as approximately spherical bodies.**<br>To know the sun, Earth and moon are spheres<br>**Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.**<br>To know the earth rotates on its own axis.<br>To know the earth rotates in 24 hrs which results in day and night.<br>To know when the surface of the earth faces the sun it is day and when the surface of the earth faces away from the sun, it is night.<br>To link this knowledge to shadows | reptiles and birds go through a simple life cycle.<br>To know that some living things undergo incomplete metamorphosis.<br>To know that some living things undergo complete metamorphosis.<br>To know the life cycle of a bird.<br>To know the life cycle of an amphibian.<br>To know the life cycle of a mammal.<br>To know the life cycle of an insect<br>**Describe the life process of reproduction in some plants and animals.**<br>To know that for reproduction to occur, female and male cells must combine.<br>To know the structure of a plant (sepals, petals, stamen, stigma, ovary and fruit).<br>To know that female plant cells are found in the ovules and male cells are found in the pollen.<br>To know that the stigma, at the centre of the flower, is sticky so that pollen remains attached. To know that after fertilisation of a plant you are left with a fruit.<br><br>**Investigation / Experiment Opportunities**<br>-Explore and observe flowers identifying structure | adolescence, middle age and old age.<br>To know that gestation is the foetal to birth.<br>To know that different animals have a different gestation period.<br>To know how to compare gestation periods of different animals.<br>To know that puberty is when a child's body begins to develop and change as they become an adult.<br><br>**Investigation / Experiment Opportunities**<br>-Plan an enquiry around growth and changes' e.g. Do our reaction times slow as we get older? What is the height of different children as they get older? | To know that Friction and gravity are two types of forces that influence how an object moves.<br>To know that Gravity is the pulling of an object towards Earth's centre<br>To know that everything on Earth is influenced by Gravity.<br>**Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.**<br>To know that air resistance is the force that passes through the air to slow falling objects down. To know that water resistance is the force that slows objects down with moving through water.<br>**Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.**<br>To know that a pulley is a wheel around which a cord passes which acts to change direction of a force applied to the cord.<br>To know that a lever is a rigid bar resting on a pivot which pressure is applied to, to move a heavy load.<br>To know that a gear is a wheel with teeth that slots together. To know that when one gear is |

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| | | | **Investigation / Experiment Opportunities**<br>-Investigate how shadows change across the day on the playground | | | turned the other one turns as well.<br><br>**Investigation / Experiment Opportunities**<br>-Test what affects a parachutes fall<br>-Test how the shape of an object affects how it moves through water<br>-Observe which objects will move across the table quicker |
| Year 6 | **Light**<br>**Recognise that light appears to travel in straight lines.**<br>To know light travels in waves in straight lines.<br>To know light waves in diagrams are drawn as straight lines with arrowheads that show the direction of travel.<br>To know the angle at which light hits a reflective surface is the same angle at which it is reflected.<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>To know shiny, smooth and light-coloured materials reflect light; dull, rough and dark-coloured materials absorb light<br>To know refraction distorts how we see things by bending the light beam<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.** | **Animals, including Humans**<br>**Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.**<br>To know the circulatory system includes the heart, blood vessels and blood.<br>To know the heart pumps blood through the blood vessels and around the body.<br>To know there are three types of blood vessel: arteries, veins and capillaries. They each have a different-sized hole (lumen) and walls.<br>**Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.**<br>To know lifestyle choices can have a positive (exercise and eating healthily) or negative (drugs, smoking and alcohol) impact on the body. | **Living Things and their Habitats**<br>**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>To know scientists classify living organisms into broad groups according to their characteristics.<br>To know vertebrates are an example of a classification group.<br>To know there are a number of ranks, or levels, within the biological classification system. The first rank is called a kingdom, the second a phylum, then class, order, family, genus and species.<br>To know classification keys help us identify living things based on their physical characteristics.<br>To know who Carl Linnaeus was | **Evolution and Inheritance**<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>To know scientists compare fossilised remains from the past to living species that exist today to hypothesise how living things have evolved over time.<br>To know humans and apes share a common ancestry and evidence for this comes from fossil discoveries and genetic comparison.<br>To know fossils are the remains or traces of once-living things preserved as rock and are over 10,000 years old.<br>To know the fossil record is ordered from the oldest fossils to the newest fossils and provides a history of Earth. The fossil record is incomplete because soft-bodied animals decayed too | **Electricity**<br>**Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.**<br>To know voltage is measured in volts (V) and is a measure of the difference in electrical energy between two parts of a circuit.<br>To know the bigger the voltage, the more electrons are pushed through 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>To know the more voltage flowing through a lamp, buzzer or motor, the brighter the lamp, the louder the buzzer and the faster the motor.<br>To know when a switch is open, it creates a gap and the current cannot travel around the circuit.<br>To know when a switch is closed, it completes the circuit and allows a current to flow all the way around it.<br>**Use recognised symbols when representing a simple circuit in a diagram.**<br>To know and use the recognised symbols for different components of circuits: cells, buzzers, switches, wires, lamps and motors.<br>To know a circuit needs a power source, such as a battery or cell, with wires connected to both the positive and negative terminals. | |

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| | To know light sources give out light. They can be natural or artificial.<br>To know when light hits an object, it is absorbed, scattered, reflected or a combination of all three. To know light from a source or reflected light enters the eye.<br>To know vertebrates, such as mammals, birds and reptiles, have a cornea and lens that refracts light that enters the eye and focuses it on the nerve tissue at the back of the eye, which is called the retina. Once light reaches the retina, it is transmitted to the brain via the optic nerve.<br>To know visible light is made up of coloured light that when mixed makes white light.<br>**Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.**<br>To know a shadow appears when an object blocks the passage of light. Apart from some distortion or fuzziness at the edges, shadows are the same shape as the object. The distortion or fuzziness depends on the position or type of light source.<br><br>**Investigation / Experiment Opportunities**<br>-Test the Law of Reflection<br>-Observe refraction using prisms<br>-Plan investigation to explore light more, e.g. Do all shiny materials reflect light? | To know the Eatwell guide presents the foods and drinks that contribute to a healthy balanced diet.<br>To know exercise helps to keep the heart healthy and makes it stronger.<br>To know the body needs more oxygen and nutrients during exercise, so the heart beats faster to pump more blood around the body.<br>To know fitter people usually have a lower heart rate and recover more quickly after exercise.<br>To know exercise benefits your heart by lowering blood pressure, reducing weight, strengthening muscles and lowering stress.<br>To know smoking, drugs and alcohol can have a negative impact on the circulatory system. For example, smoking can result in cancer and heart disease. Alcohol can cause high blood pressure and increased stroke risk. Drugs can cause collapsed veins and cardiac arrest<br>**Describe the ways in which nutrients and water are transported within animals, including humans.**<br>To know the blood carries gases (oxygen and carbon dioxide), water and nutrients to where they are needed. The red blood cells carry oxygen and carbon dioxide around the body. The blood also contains white blood cells, which | **Give reasons for classifying plants and animals based on specific characteristics.**<br>To know living things are classified into groups, according to common observable characteristics and based on similarities and differences.<br>To know that vertebrates have key features which distinguish them between the main groups of vertebrates (animals with backbones). They are their skin coverings and the place where they live.<br>To know that invertebrates are animals without backbones.<br><br>**Investigation / Experiment Opportunities**<br>-Create classification keys | quickly to be fossilised, and some fossils are still buried in the ground.<br>To know that the Theory of Evolution was developed by Charles Darwin in 19th century<br>**Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.**<br>To know the difference between inherited and acquired characteristics<br>To know variation is the natural differences in characteristics between individuals of the same species.<br>**Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.**<br>To know an adaptation is a physical or behavioural trait that allows a living thing to survive and fill an ecological niche. To know adaptations evolve by natural selection.<br>To know favourable traits help an organism survive and pass on their genes to subsequent generations<br>To know animals and plants can be bred to produce offspring with specific and desired characteristics. This is called selective breeding. | **Investigation / Experiment Opportunities**<br>-Test how voltage across a circuit affects the brightness of a lamp<br>-Plan and carry out an enquiry to find out if wire length affects how a circuit works |

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| | | protect the body from infection.<br><br>**Investigation / Experiment Opportunities**<br>-Investigate whether there is a link between resting heart rate and time it takes to run around the track<br>-Investigate blood flow | | **Investigation / Experiment Opportunities**<br>-Darwin's Beak experiment<br>-Generate a testable hypothesis around inherited characteristics and plan an enquiry, e.g. People with large hand spans have large feet, children with brown hair have brown eyes | |