Bredbury Green Primary School: Rationale Behind The Science Curriculum

	What we teach? (Minimum Requirement From NC)	Component Knowledge	Why we teach it now? (Rationale)	Key Vocabulary
Early Years	**Communication and Language** • Offer explanations for why things might happen, making use of recently introduced vocabulary from stories, non-fiction, rhymes and poems when appropriate **Understanding the World** • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter **Numerical Patterns** • Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than, or the same as the other quantity **Article 7** **Communication and Language** **Can you tell me why something happens, like in the story or what you see outside?** **Understanding the World** **What is the same or different about what you see outside and what you read about or have seen somewhere else?** **Numerical Patterns** **Which group has more, less, or the same number of things?**	• To name the people in my family. • To use the word because to give a simple explanation. • To list 2 seasonal changes they see per season. • To understand appropriate clothing for different types of weather. • To be able to identify a hot or cold location. • To be able to identify which animals live in hot and cold locations. • To order a lifecycle. (a human, a plant, an animal or an insect) • To explain what happens when something melts, freezes, or cooks. • To explain how my actions can cause a change to materials.	**Developing Scientific Vocabulary in Nursery:** Me, list their family members, growth, old, young, baby, nature/natural, hot, cold, change, different, living, pull, twist, push, grow, plants, changes, seeds, melting, freezing, sinking, floating, animals, order **Developing Scientific Vocabulary in Reception:** Extended family members, Adult, Teenager, Child, Toddler, Baby, seasons, hear, feel, see, world, Winter, Spring, Summer, Autumn, environment, differences, similarities, animals lifecycle, sequence, living, stem, flower, seeds, plant, roots, petal, leaf, butterfly, cocoon, chrysalis, caterpillar, egg	

	Ask questions and plan enquiry	Set up enquiry	Observe and measure	Record	Interpret and report	Evaluate
EY/KS1	Ask simple questions and recognise that they can be answered in different ways	Perform simple tests	Observe closely using simple equipment	Gather and record data to help in answering questions.	Use their observations and ideas to suggest answers to questions. Identify and classify. Use appropriate scientific language to communicate ideas.	

Year 1 **Autumn**	**Animals including Humans** **STRUCTURES** • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. • Name the body parts of a human • Know the name of each of the five senses • Know which body parts are associated with each sense **Seasonal Changes** **CAUSE AND EFFECT** • Observe changes across the four seasons • Observe and describe weather associated with the seasons and how day length varies. • Know the 4 seasons and describe how the weather changes.	• Name the body parts including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth. • Name the 5 senses. • Know which body part is associated with which of the 5 senses. **Seasonal changes** • Know the 4 seasons and the weather in each season. • Know that it gets darker earlier in the winter and it stays lighter longer in the summer. • Know and describe how the weather changes in each season.	**Prepares for**: Pupils will notice animals have offspring which grow into adults and describe the basic needs of humans. **Builds on**: ELG – Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter **Prepares for**: Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	Senses head neck arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth. Taste, touch, hear, feel, smell. Similarities Differences Seasons Winter Spring Summer Autumn Weather Change Comparison
Year 1 **Spring**	**Plants** **STRUCTURES** • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • Identify and describe the basic structure of a variety of common flowering plants, including trees. • Know the names of some common wild and garden plants and that they grow from a seed or bulb • Know the difference between a deciduous and an evergreen tree • Know the following parts of a plant: leaves, flowers, petals, fruit, roots, seed, trunk, branch, stem **Everyday Materials** **CAUSE AND EFFECT** • Distinguish between an object and the material from which it is made	Plants • know that plants grow from a seed or a bulb • Know plant structure including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem. • Know that bluebells, daisies and dandelions are wild plants • Know that roses, sunflowers and tulips are garden plants. • Know what a deciduous tree is and an evergreen tree. • Know what is different between an evergreen and a deciduous tree. Everyday Materials • Name common materials: rock, paper, glass, wood and plastic • Know that rock and wood is hard. Know that paper is bendy. Know that glass is shiny and can be smashed. Know that these are called properties • Know that objects are made from one or more materials. Know that tables are made from wood	**Builds on**: ELG – Explore the natural world around them, making observations and drawing pictures of animals and plants and understand some important processes and changes in the natural world around them, including the seasons and changing states of matter **Prepares for**: Pupils will describe how seeds and bulbs grow into mature plants and describe how plants need water, light and a suitable temperature to grow. **Builds on**: • ELG – Safely use and explore a variety of materials and tools **Prepares for**:	Deciduous Evergreen Stem Flower Plant Roots Petal Leaf Object Material Wood Plastic Glass Metal Rock Comparison Similarities Differences Properties

	• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • Describe the simple physical properties of a variety of everyday materials • Compare and group together a variety of everyday materials on the basis of their simple physical properties. • Know the name of some common materials e.g. rock, paper, glass, wood, plastic • Know the properties of some common materials e.g. shiny, bendy, stiff, hard • Know that objects are made from materials and that they can be made from more than one material **Supported by**: • identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least • measure and begin to record the following: ♣ lengths and heights ♣ mass/weight ♣ capacity and volume ♣ time (hours, minutes, seconds)	and often metal. Know that windows are made from glass. Know that bottles are made from plastic.	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. • Compare how things move on different surfaces.	
Year 1 **Summer**	**<u>Animals, including Humans</u>** **APPRECIATION** • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • Identify and name a variety of common animals that are carnivores, herbivores and omnivores • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) • Know the names of the five main animal groups • Know the difference between carnivore, herbivore and omnivore • Know the major physical characteristics of each animal group **Supported by**: compare, describe and solve practical problems for: ♣ lengths and heights [for example, long/short, longer/shorter, tall/short, double/half] ♣ mass/weight [for example, heavy/light, heavier than, lighter than] ♣ capacity and volume [for example, full/empty, more than, less than, half, half full, quarter] ♣ time [for example, quicker, slower, earlier, later]	• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • Know that a carnivore eats meat, a herbivore eats plants and an ominovre eats both. • Describe and compare the structure of a variety of common the 5 main animal groups. • Know that a bird has feathers and a beak • Know that a fish has scales and lives under water. • Know that a mammal has hair and breaths air • Know that an amphibian lives on water and on land and doesn't have scales • Know that a reptile has scales and lives on land.	**Builds on**: • ELG - Explore the natural world around them, making observations and drawing pictures of animals and plants • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. **Prepares for**: • Notice that animals, including humans, have offspring which grow into adults • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	Amphibians Reptiles Mammals Birds Fish Carnivores Herbivores Omnivores Comparison Similarities Differences

Year 2 **Autumn**	**<u>Living Things and their Habitats</u>** **CAUSE AND EFFECT, POWER** • Explore and compare the differences between things that are living, dead, and things that have never been alive • 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 • Identify and name a variety of plants and animals in their habitats, including microhabitats • 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. • Know the difference between living, non-living and dead and accurately classify them, as well as the essentials for human survival • Know that most living things live in a habitat and can give examples of contrasting habitats and the animals that live in them • Know some examples of basic food chains **Supported by**: • recognise, find, name and write fractions 3 1 , 4 1 , 4 2 and 4 3 of a length, shape, set of objects or quantity • choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels • compare and sequence intervals of time	**<u>Know 5 key facts about Living Things and their Habitats</u>** • Know and name different habitats. • Say what are the basic needs for things to survive and grow are. • Name some plants and animals and say which habitats they live in. • Be able to name 2 basic food chains and label these correctly. • Know how to classify whether something is alive, dead or has never been alive.	**Builds on**: • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • Identify and name a variety of common animals that are carnivores, herbivores and omnivores • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) **Prepares for**: • Recognise that living things can be grouped in a variety of ways • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • Recognise that environments can change and that this can sometimes pose dangers to living things	*Amphibians* *Reptiles* *Mammals* *Birds* *Fish* *Insects* *Carnivores* *Herbivores* *Omnivores* *Structure* *Comparison* *Similarities* *Differences* Living Dead Never alive Habitats Micro-habitats Ocean Forest Desert Arctic Grassland Food chain Consumer Producer Prey Predator Carnivore Herbivore Omnivore
Year 2 **Spring**	**<u>Uses of Everyday Materials</u>** **CAUSE AND EFFECT** • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. • Compare how things move on different surfaces. • Know how the shape of a solid might be changed by squashing, bending, twisting and stretching • Can give examples of products/objects that might be made from a particular material and explain why	**<u>Know 5 key facts about Uses of Everyday Materials</u>** • To name a variety of everyday materials. • Link materials to particular uses. • To have an understanding of why certain materials are used for certain objects. • Know that solid shapes can be changed through different forces. • To know the speed of a car changes depending on the material it is travelling on.	**Builds on**: • Distinguish between an object and the material from which it is made • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • Describe the simple physical properties of a variety of everyday materials • Compare and group together a variety of everyday materials on the basis of their simple physical properties. **Prepares for**: • Compare and group materials together, according to whether they are solids, liquids or gases • Observe that some materials change state when they are heated or cooled, and measure or research the	*Object* *Material* *Wood* *Plastic* *Glass* *Metal* *Rock* *Comparison* *Similarities* *Differences* *Properties* Suitability Materials Properties e.g: Waterproof

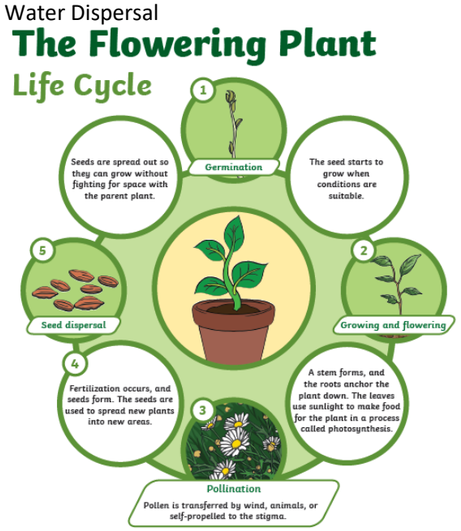
	• Know why certain materials would be unsuitable for specific purposes **Supported by**: • compare and order lengths, mass, volume/capacity and record the results using >, < and = • identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line • use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anticlockwise).		temperature at which this happens in degrees Celsius (°C) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Absorbent Weak Strong Soft Hard Transparent Translucent Shiny Dull Rough Smooth
Year 2 **Summer**	**Animals including Humans** **STRUCTURES** • Notice that animals, including humans, have offspring which grow into adults • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • Describe the importance for humans to exercise, eating the right amounts of different types of food, and hygiene. • Knows that all animals need food, water, shelter and oxygen to survive • Give examples of animals and their young, understanding that offspring grow into adults • Know why it is important for humans to exercise and how a balanced diet contributes to good physical health **Article, 24, Health and Health services** **Animals & Offspring** **What do animals need to survive, and how do babies grow into adults?** **Can you give examples of animals and their babies?** **Human Health** **Why is it important for us to exercise every day?** **How does eating a balanced diet help us stay healthy?** **Plants** **CAUSE AND EFFECT** • Observe and describe how seeds and bulbs grow into mature plants • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	**Know 5 key facts about Animals including Humans** • To know the meaning of offspring. • Name offspring and match to their adults. • To know what a human needs to survive. • To name ways we can keep fit and healthy. • To know what types of food we need to eat and why. **Know 5 key facts about Plants** • To know the life cycle of a plant. • To name the stages in a plant life cycle linked to growth. • To know what plants need to be able to survive. • To talk about the effects of taking away a basic need from a plant. • To make observations of a growing plant.	**Builds on**: • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. • 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 **Prepares for:** • 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 • Identify that humans and some other animals have skeletons and muscles for support, protection and movement. **Builds on**: • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • Identify and describe the basic structure of a variety of common flowering plants, including trees. **Prepares for:** • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • 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	*Senses* *head neck arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth.* *Taste, touch, hear, feel, smell.* *Similarities* *Differences* Offspring Young Adult Egg Reproduce Die Cycle Water Food Air Shelter Carbohydrates Protein Vitamins Fruit Vegetables Fats Dairy *Deciduous* *Evergreen* *Stem* *Flower* *Plant*

	• Know the stages a plant goes through when growing from a seed/bulb to a mature plant • Know that plants need water, oxygen and sunlight to survive • Explain and observe what would happen to a plant if it did not get enough water, oxygen or sunlight		• Investigate the way in which water is transported within plants • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	*Roots* *Petal* *Leaf* *Nutrients* Plant Seeds Bulbs Water Light Temperature Germination Nutrients Soil

	Ask questions and plan enquiry	Set up enquiry	Observe and measure	Record	Interpret and report	Evaluate
EY/KS1	Ask simple questions and recognise that they can be answered in different ways	Perform simple tests	Observe closely using simple equipment	Gather and record data to help in answering questions.	Use their observations and ideas to suggest answers to questions. Identify and classify. Use appropriate scientific language to communicate ideas.	

Year 3 **Autumn**	**Animals, including Humans** **POWER** • 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 • Identify that humans and some other animals have skeletons and muscles for support, protection and movement. • Name significant parts of the human skeletal system • Explain the difference between an endoskeleton, exoskeleton and hydrostatic skeleton and give examples of animals with each • Know that animals (including humans) need specific nutrition and how they get it **Article 6, life survival and development.** **Human Skeleton** **What are the important parts of the human skeleton, and what do they do?** **How is an endoskeleton different from an exoskeleton or hydrostatic skeleton? Can you give examples of animals with each type?** **Nutrition** **Why do humans and animals need certain foods to stay healthy?** **How do different foods help us grow and develop properly?** **Light** **INFLUENCE** • Recognise that they need light in order to see things and that dark is the absence of light • Notice that light is reflected from surfaces • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes • Recognise that shadows are formed when the light from a light source is blocked by an opaque object • Find patterns in the way that the size of shadows change. • Know that light is needed in order to see things and can describe darkness as the absence of light • Explain why shadows are formed and how shadows can be changed	Animals including humans Name significant parts of the human skeletal system • Skull • Rib cage • Femur • Fibula • Clavicle • Humerus • Pelvis • Tibia Know that animals have skeletons and muscles for support, protection and movement. Name muscles in arms – biceps and triceps and how they relax and contract and work in pairs. Explain the difference between an endoskeleton, exoskeleton and hydrostatic skeleton and give examples of animals with each Know that animals (including humans) need specific nutrition and how they get it • To know the 5 food groups – carbohydrates, diary, protein, vegetables and fats and give examples of these. • To know what they do to the body – gives us energy, helps us to digest etc • To know what a balanced and varied diet is and be shown examples of these. • To know that animals cannot make their own food, unlike plants who use photosynthesis Recognise that they need light in order to see things and that dark is the absence of light. To know the different sources of light and that the moon is not a light source. To know that light from the sun can be dangerous and give examples of sun safety e.g. sunscreen, sun glasses. To notice that light is reflected from surfaces – to know opaque, transparent and translucent and which of these light can be reflected from and why.	**Builds on**: • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. **Prepares for**: • Describe the simple functions of the basic parts of the digestive system in humans • Identify the different types of teeth in humans and their simple functions • Construct and interpret a variety of food chains, identifying producers, predators and prey **Prepares for:** • Identify common appliances that run on electricity • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • 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 • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • Recognise some common conductors and insulators, and associate metals with being good conductors.	*Offspring* *Young* *Adult* *Egg* *Reproduce* *Die* *Cycle* *Water* *Food* *Air* *Shelter* *Carbohydrates* *Protein* *Vitamins* *Fruit* *Vegetables* *Fats* *Dairy* Skeleton – bone names Endoskeleton Exoskeleton Hydrostatic skeleton Muscles – names of these Relax and contract Nutrition Carbohydrates Fats Vitamins Protein Fruits and vegetables Minerals Dairy Absence Absorb Reflect Opaque Translucent Transparent Shadow Dangerous Block Source

	• Know that light from the sun can be dangerous and give examples of sun safety e.g. sunscreen, sun glasses **Supported by:** • recognise angles as a property of shape or a description of a turn • identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle • identify horizontal and vertical lines and pairs of perpendicular and parallel lines.	To perform experiments to recognise that shadows are formed when the light from a light source is blocked by an opaque object and how they can be changed based upon how close the light source or object is.		
Year 3 **Spring**	**Forces and Magnets** **STRUCTURE** • Compare how things move on different surfaces • Notice that some forces need contact between two objects, but magnetic forces can act at a distance • Observe how magnets attract or repel each other and attract some materials and not others • 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 • Describe magnets as having two poles • Predict whether two magnets will attract or repel each other, depending on which poles are facing. • Know that magnets attract and repel and that magnetic force is a non-contact force • Can group materials into magnetic and non-magnetic materials • Explain what a force is and give examples of a contact force	To know that magnets attract and repel and that magnetic force is a non-contact force – perform experiments based upon this. Group materials into magnetic and non-magnetic materials and talk about the different metals and how they are not all magnetic. Know that magnets have a north and south pole and which attract to each other. Explain what a force is and give examples of a contact force. Be able to give examples of a contact force.	**Builds on:** • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. • Compare how things move on different surfaces. **Prepares for:** • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	*Suitability* *Materials* *Properties e.g:* *Waterproof* *Absorbent* *Weak* *Strong* *Soft* *Hard* *Transparent* *Translucent* *Shiny* *Dull* *Friction* *Rough* *Smooth* *Slope* *Surface* North South Pole Attract Repel Magnetic Materials Force Surface Non-magnetic Magnetic field
Year 3 **Summer**	**Plants** **SIGNIFICANCE / CAUSE AND EFFECT** • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers	Know, identify and describe the parts of flowering plants (roots, stem, leaves, flowers and seeds), as well as their functions (including pollination and fertilisation).	**Builds on:** • Observe and describe how seeds and bulbs grow into mature plants	*Plant* *Seeds* *Bulbs* *Water* *Light*

	• 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 • Investigate the way in which water is transported within plants • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. • Know, identify and describe the parts of flowering plants, as well as their functions (including pollination and fertilisation) • Know the way in which water is transported in a plant and why they do not eat food • Explain the life cycle of a flowering plant and the three types of seed dispersal **Rocks** **STRUCTURE / POWER** • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • Describe in simple terms how fossils are formed when things that have lived are trapped within rock • Recognise that soils are made from rocks and organic matter. • Know the three different types of rock and how they are created • Know the properties of rocks and classify them based on their properties • Know the different types of fossils and explain the fossilisation process **Supported by:** • interpret and present data using bar charts, pictograms and tables • solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables. • measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) • estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight	Identify the male and female parts of the plants in order to support fertilisation and pollination explanation. Know the process of fertilization and pollination in plants. Know how water is transported in a plant and know that xylem are the special tubes water is transported in. Understand what photosynthesis is. Know the three main types of seed dispersal. 1. Wind Dispersal 2. Animal Dispersal 3. Water Dispersal  <u>Rocks and fossils:</u> Know how the different types of rock; igneous, sedimentary and metamorphic are made and give examples of each. Explore the properties of rocks including colour, texture, hardness, weight and layering. Classify rocks into three main groups based on their properties: 1. Igneous Rocks:	• Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. **Prepares for:** • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • Describe the life process of reproduction in some plants and animals. **Builds on:** • Distinguish between an object and the material from which it is made • Describe the simple physical properties of a variety of everyday materials **Prepares for:** • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago	*Temperature* *Germination* *Nutrients* *Soil* Seeds Germination Pollination Fertilisation Seed dispersal Stigma Style Ovary Ovule Carpel Petal Anther Sepal Filament Stamen Pollen Sedimentary Igneous Metamorphic Volcano Volcanic Fossil Ash Lava Amber Preserve

	• know the number of seconds in a minute and the number of days in each month, year and leap year • compare durations of events [for example to calculate the time taken by particular events or tasks].	○ Properties: Often have a shiny or glassy texture and can be light or dark in colour, depending on the minerals inside. ○ Examples: Granite (light-coloured) and basalt (dark-coloured). 2. Sedimentary Rocks: ○ Properties: Usually have a layered appearance, can be grainy, and may contain fossils or shells. They are often softer and lighter than other types of rock. ○ Examples: Sandstone (grainy) and limestone (often contains fossils). 3. Metamorphic Rocks: ○ Properties: Can be very hard, often have a banded or layered look, and may have shiny spots called minerals. They can feel smooth or rough. ○ Examples: Marble (smooth and shiny) and schist (layered and sparkly). <u>Fossils</u> Know the different types of fossils and examples of each; body fossils, trace fossils (footprints, burrows and coprolites), amber fossils and mold and cast fossils. Understand the fossilization process including death, burial, pressure, mineralisation, erosion and discovery.		
Year 4 **Autumn**	**<u>Sound</u>** **STRUCTURES / CAUSE AND EFFECT** • Identify how sounds are made, associating some of them with something vibrating • Recognise that vibrations from sounds travel through a medium to the ear • Find patterns between the pitch of a sound and features of the object that produced it • Find patterns between the volume of a sound and the strength of the vibrations that produced it • Recognise that sounds get fainter as the distance from the sound source increases. • Know that sounds are a form of wave and associate how sounds are made with something vibrating	**<u>Sound</u>** • To recognise sounds as a form of wave • To know how sounds are made – understand that sounds are made when an object vibrates • To know that the vibration makes the air around vibrate and the air vibrations then enter the ear • To know that vibrations are heard as sounds • To know that sound waves can travel through solids, liquids and gasses • Can use the term pitch accurately, recognising if an object produces a high or low pitch sound • To predict if an object will make a high or low pitch sound • Can use the term volume accurately, recognising if an object produces a loud or quiet/soft sound	**Prepares for:** • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • 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	Vibrations Sound Pitch Frequency Rhythm Volume Hertz Decibels Echo Amplify Sound wave Medium Travel Eardrum Ear canal Tuning

	• Know how sound travels through a medium to the ear and are then heard • Can use the terms pitch and volume accurately and can predict if an object will make a high or low pitched sound **Supported by:** • Convert between different units of measure [for example, kilometre to metre; hour to minute] • estimate, compare and calculate different measures, including money in pounds and pence **Article 23: How might people with hearing difficulties hear or experience sounds differently?**			Distance
Year 4 **Spring**	**Living Things and their Habitats** **INFLUENCE / SIGNIFICANCE** • Recognise that living things can be grouped in a variety of ways • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • Recognise that environments can change and that this can sometimes pose dangers to living things • Know that plants can be separated into flowering and non-flowering, giving examples of each • Know what classification keys are and how to correctly interpret them • Know that environments can change and that this can pose dangers to living things **Animals, including Humans** **SIGNIFICANCE / CAUSE & EFFECT** • Describe the simple functions of the basic parts of the digestive system in humans • Identify the different types of teeth in humans and their simple functions • Construct and interpret a variety of food chains, identifying producers, predators and prey • Name the organs which make up the digestive system and their functions	**Living Things and their Habitats** • Recognise what makes a plant a flowering plant (produce flowers or seeded fruits) • Recognise what makes a plant non-flowering (do not produce seeds, fruits or flowers) • Give some examples of flowering and non-flowering plants	**Builds on:** • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • Identify and name a variety of common animals that are carnivores, herbivores and omnivores • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) **Prepares for:** • 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 • Give reasons for classifying plants and animals based on specific characteristics. **Builds on**: • Explore and compare the differences between things that are living, dead, and things that have never been alive • 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.	Classification key Environment Habitat Adaptation Predators Prey Consumers Food source Carnivore Omnivore Herbivore Organisms Sensitivity MRS GREN Food chain Digestive system – organs linking to this Functions

	• Explain the digestive system in stages and how this is essential for survival (nutrients and waste) • Know the different types of teeth humans have, their function and how they support digestion **Article 6: What are the main organs in the digestive system, and what do they do?** **Can you explain what happens to food as it goes through the digestive system?** **What types of teeth do humans have, and how do they help us digest food?**		**Prepares for:** • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • Describe the ways in which nutrients and water are transported within animals, including humans.	
Year 4 **Summer**	**States of Matter** **CAUSE AND EFFECT / STRUCTURES** • Compare and group materials together, according to whether they are solids, liquids or gases • 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) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. • Know and describe the different stages of the water cycle and what is meant by evaporation and condensation • Describe solids, liquids and gases in terms of their particle structure and explain how changes of state occur (through cooling and heating) • Know that the boiling point of water is 100 degrees Celsius and the freezing point is 0 degrees Celsius **Supported by:** • Convert between different units of measure [for example, kilometre to metre; hour to minute] • count in multiples of 6, 7, 9, 25 and 1000 • find 1000 more or less than a given number • count backwards through zero to include negative numbers **Electricity** **POWER / STRUCTURES** • Identify common appliances that run on electricity • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers		**Builds on:** • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. **Prepares for:** • 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 • Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • Demonstrate that dissolving, mixing and changes of state are reversible changes • 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. **Prepares for:** • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit	Solid Liquid Gas Temperature Degrees Celsius Evaporation Water cycle Condensation Water vapour Melting Molecules Solidify Changing state Matter Electrical circuit Cells Wires Buzzers Switches Current Loop Conductors Insulators Appliances Metal Mains Battery Power

	• 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 • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • Recognise some common conductors and insulators, and associate metals with being good conductors. • Know and name the components needed to make a simple circuit • Predict if a circuit will cause a lamp to light or not • Construct a circuit to a lightbulb accurately **Supported by:** • interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.		• 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 • Use recognised symbols when representing a simple circuit in a diagram.	Bulb

	Ask questions and plan enquiry	Set up enquiry	Observe and measure	Record	Interpret and report	Evaluate
LKS2	Ask scientific questions and use different types of scientific enquiry to answer them	Set up simple practical enquiries, comparative and fair tests	Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers	Gather, record, classify and present data in a variety of ways to help in answering questions. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Identify differences, similarities or changes related to simple scientific ideas and processes.	Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Use straightforward scientific evidence to answer questions or to support their findings.

Year 5 **Autumn**	**<u>Living Things and their Habitats</u>** **POWER / INFLUENCE** • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • Describe the life process of reproduction in some plants and animals. • Know the life cycle of a mammal, amphibian, insect and a bird • Know how some plants produce through asexual reproduction e.g. strawberry plant • Know animals produce through sexual reproduction	Know the life cycle of a mammal, amphibian, insect and a bird • Whale, toad, ant, pigeon Know how some plants produce through asexual reproduction • Strawberry plant, spider plant Know animals produce through sexual reproduction • Differences in gestation periods between humans and whales • Know that there needs to be male and female component	**Builds on:** • Construct and interpret a variety of food chains, identifying producers, predators and prey **Prepares for:** • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Classification Process Life Cycle Process Reproduction Gestation Sexual Asexual Sperm Ovum Fertilisation

	Article 6: What are the stages in the life cycle of a mammal, bird, amphibian, or insect, and why is each stage important for survival? **How do animals grow and develop from babies into adults?** **Animals, including Humans** **CAUSE AND EFFECT / APPRECIATION** • Describe the changes as humans develop to old age. • Know the life cycle of a human • Know the changes a female and male body will undergo during puberty • Know the changes a human body will go through from adulthood to old age **Article 6: What are the main stages of a human life cycle, and why is each stage important for growth and development?** **What changes happen in a female and male body during puberty, and why do they happen?** **How do these changes help the body develop into adulthood?**	Know the life cycle of a human Know the changes a female and male body will undergo during puberty • Physical changes eg hair growth, breasts, height, voices, odour, skin Know the changes a human body will go through from adulthood to old age • Physical changes eg wrinkles, hair loss, sarcopenia (shrinkage), skin, osteoporosis, arthritis	**Builds on:** • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • Describe the life process of reproduction in some plants and animals. **Prepares for KS3:** **Reproduction** ▪ reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta ▪ reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.	Puberty Penis Vulva Vagina Nipple Breast Scrotum Testicle Facial hair Body odour Sarcopenia Osteoporosis Arthritis
Year 5 **Spring**	**Earth and Space** **CAUSE & EFFECT / STRUCTURES** • Describe the movement of the Earth, and other planets, relative to the Sun in the solar system • Describe the movement of the Moon relative to the Earth • Describe the Sun, Earth and Moon as approximately spherical bodies • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. • Know the names of the planets in order of distance from the sun, understanding that the sun, Earth and moon are approximately spherical bodies • Know how to describe the movement of the moon relative to Earth • Know that the Earth rotates and why it appears that the sun 'moves across the sky' **Supported by:** • know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles	Know the names of the planets in order of distance from the sun, understanding that the sun, Earth and moon are approximately spherical bodies • Pneumonic to support children to remember the planet order Know how to describe the movement of the moon relative to Earth • Know that the moon orbits the Earth and the Earth orbits the Sun Know that the Earth rotates and why it appears that the sun 'moves across the sky'	**Prepares for KS3**: **Space physics** ▪ gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only) ▪ our Sun as a star, other stars in our galaxy, other galaxies ▪ the seasons and the Earth's tilt, day length at different times of year, in different hemispheres ▪ the light year as a unit of astronomical distance.	Solar System Philosopher Relative Spherical Rotation Axis Geocentric Heliocentric Aviation Space Galaxy Milky Way Constellation Unsupported Orbit Force Gravity Centrifugal Acting Resistance Contact force Non-contact force

	• draw given angles, and measure them in degrees (o) • identify: • angles at a point and one whole turn (total 360) • angles at a point on a straight line and half a turn (total 180) • other multiples of 90 **Forces** **POWER / CAUSE & EFFECT** • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. • Know that objects fall to Earth because of the force of gravity and that a force can be a push or pull • Name and describe air resistance, water resistance and friction • Know the difference between a balanced and unbalanced force **Supported by:** • solve problems involving converting between units of time • use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.	Know that objects fall to Earth because of the force of gravity and that a force can be a push or pull • History of Isaac Newton Name and describe the effects of air resistance, water resistance and friction Know the difference between a balanced and unbalanced force • Investigate levels, pulleys, gears through a fair test experiment	**Builds on:** • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. • Compare how things move on different surfaces. **Prepares for KS3:** **Forces and motion** ▪ forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) ▪ change depending on direction of force and its size.	Friction Mechanism Level Pulley Gear
Year 5 **Summer**	**Properties and Changes of Materials** **STRUCTURE / CAUSE & EFFECT** • 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 • Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic	Classify materials based on their properties – specifically considering hardness, solubility, transparency, conductivity (electrical and thermal) and response the magnets Know the difference between a reversible and irreversible change and explain how some changes result in the formation of new material Give examples of a reversible and irreversible change e.g. melting, freezing, evaporating, condensing, burning, rusting	**Builds on:** • Compare and group materials together, according to whether they are solids, liquids or gases • 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) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **Prepares for KS3:** **The particulate nature of matter** ▪ the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure ▪ changes of state in terms of the particle model.	Appropriate Solubility Matter Substance Reversible Irreversible Conductivity Transparency Properties Materials Solution Dissolving Mixing Solids Liquids Gases

	• Demonstrate that dissolving, mixing and changes of state are reversible changes • 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. • Know the difference between a reversible and irreversible change and explain how some changes result in the formation of new material • Give examples of a reversible and irreversible change e.g. melting, freezing, evaporating, condensing, burning, rusting • Classify materials based on their properties – specifically considering hardness, solubility, transparency, conductivity (electrical and thermal) and response the magnets			
Year 6 **Autumn**	**Living Things and their Habitats** **STRUCTURES** • 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 • Give reasons for classifying plants and animals based on specific characteristics. • Knows the layers of the Linnean classification system and how it can be used to classify living things • Know the difference between an organism and micro-organisms • Know examples of micro-organism groups e.g. fungi, bacteria **Animals, including Humans** **CAUSE & EFFECT / STRUCTURES** • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • Describe the ways in which nutrients and water are transported within animals, including humans. • Know the organs in the circulatory system and their functions, as well as the function of the circulatory system		**Builds on:** • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • Describe the life process of reproduction in some plants and animals. **Prepares for KS3**: ▪ differences between species ▪ the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation ▪ the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection **Builds on:** • Describe the simple functions of the basic parts of the digestive system in humans • Identify the different types of teeth in humans and their simple functions • Construct and interpret a variety of food chains, identifying producers, predators and prey **Prepares for KS3:**	Biome Microorganism Carl Linneus Circulatory system Atrium Ventricles Vessels Veins Nutrients Endemic Flora Fauna

	• Know the components of blood and how it travels around the body, delivering oxygen and removing carbon dioxide • Know why exercise is important and how this supports a healthy cardiac system, as well as risks to the circulatory system e.g. drugs and diet **Article 6: What are the main organs in the circulatory system, and what does each one do?** **How does the circulatory system help the body survive and stay healthy?**		**Gas exchange systems** ▪ the structure and functions of the gas exchange system in humans, including adaptations to function ▪ the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume ▪ the impact of exercise, asthma and smoking on the human gas exchange system	
Year 6 **Spring**	**Light** **INFLUENCE / STRUCTURES** • Recognise that light appears to travel in straight lines • 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 • 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 • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. • Know that light travels in straight lines and cannot bend • Know why objects underwater might appear differently and that light reflects • Know the parts of the eye and how they contribute to vision **Supported by:** • use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places • recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. **Electricity** **CAUSE & EFFECT / POWER** • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • 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		**Builds on:** • Recognise that they need light in order to see things and that dark is the absence of light • Notice that light is reflected from surfaces • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes **Prepares for KS3:** **Light waves** ▪ the similarities and differences between light waves and waves in matter ▪ light waves travelling through a vacuum; speed of light ▪ the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface **Builds on:** • Identify common appliances that run on electricity • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers	Reflection Refraction Silhouette Circuit Symbol Volt Current Diagram Ammeter

	• Use recognised symbols when representing a simple circuit in a diagram. • Know the symbols for basic electrical components • Know how to draw a complete circuit diagram using electrical symbols • Know what happens to the brightness of a lamp when cells are added to a circuit and explain why **Supported by:** • solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate • use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places		• 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 • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • Recognise some common conductors and insulators, and associate metals with being good conductors. **Prepares for KS3:** **Electricity and electromagnetism** **Current electricity** ▪ electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge ▪ potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current ▪ differences in resistance between conducting and insulating components (quantitative).	
Year 6 **Summer**	**Evolution and Inheritance** **SIGNIFICANCE / STRUCTURES** • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. • Know how to define evolution and that natural selection and variation leads to successful adaptation over time • Know how the fossil record can be used to tell us about evolution and changes over time • Know what inheritance is and that sexual production results in non-identical offspring **Article 29 and 6: How does learning about evolution help us understand the world around us?** **Why is it important to know how traits are passed on and how species change over time?** **How can studying fossils teach us about the history of life on Earth?**		**Builds on:** • 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 • Give reasons for classifying plants and animals based on specific characteristics. **Prepares for KS3:** **Genetics and evolution** **Inheritance, chromosomes, DNA and genes** ▪ heredity as the process by which genetic information is transmitted from one generation to the next ▪ a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model ▪ differences between species ▪ the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation ▪ the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection ▪ changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction ▪ the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.	Evolution Inheritance Species HMS Beagle Variation Offspring Disorder Ancestry Charles Darwin Mary Anning Galapagos

	Ask questions and plan enquiry	Set up enquiry	Observe and measure	Record	Interpret and report	Evaluate

UKS2	Plan different types of scientific enquiry to answer their own questions, including recognising and controlling variables where necessary	Use test results to make predictions to set up further comparative and fair tests	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.	Report and present findings from enquiries, inc conclusions and causal relationships, in oral and written forms such as displays and other presentations, using appropriate scientific language.	Explain degree of trust in results. Identify and evaluate scientific evidence (their own and others') that has been used to support or refute ideas or arguments.	