Science Curriculum Map and Progression document

St Peter's is an active Catholic Community, inspired by the life of Jesus. It is a place where children learn and grow in a happy, secure and nurturing environment with Christ at its centre.

At St Peter's our aims are that:

- Everyone is encouraged to strive to achieve individual excellence in all learning experiences.
- As part of the Catholic Church in Winchester we support all members of the School community in their journey of faith, by acknowledging and celebrating the presence and active love of God.
- As a Christian community we reach out to parents, the community and the wider world**.**

The Vision and Mission statements underpin the school curriculum. From these a culture and ethos is generated that supports the spiritual development of all involved in the community. The school is committed to ensuring that the curriculum is broad and balanced in order that the needs of all children are provided for and the uniqueness of each individual is valued. We develop the whole child through striving for excellent academic achievement along with valuing the spiritual, social, moral, cultural, physical and creative development of each individual.

We believe that intelligence is multi-faceted, and children learn in different ways; the curriculum must support this.

In all subjects, **recalling pre-knowledge and skills** is fundamental to our rationale for all curriculum areas. This means that essential linked knowledge/ skills are **revised** and links made with children's current learning in all subjects. Key concepts/ end points for each topic are highlighted and **over-learning** of these areas occurs through **repetition, modelling and scaffolding of learning**. Through our subject-specific Schemes of Work, we make sure that learning for all is progressive and sequential. In addition, reading and vocabulary are emphasised in all subjects. Thus, key concepts become embedded in the **long-term memory.**

SCIENCE

Purpose of study

At St Peters we follow the Hampshire model of teaching and learning in science, which focuses on integrating working scientifically within an enquiry led curriculum. We provide the foundations for understanding the world through the specific disciplines of: biology, chemistry and physics. Science has changed and continues to change our lives and it is vital to the world's future prosperity, that all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through our hand-on, skills based approach, we aim to building up a body of key foundational knowledge and concepts. Pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. Instilling a sense of awe and wonder is at the heart of our curriculum to ensure children become lifelong learners with open minds to observe, predict and analyse the natural. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims

We aim to ensure that all pupils

- develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them

equip children with the scientific knowledge required to understand the uses and implications of science, today and for the future.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS						

Knowledge and Understanding

During the EYFS at St Peter's school, children will take part in practical hands on activities and conversations which encourage scientific thinking. Looking closely at the world around them and making links between their experiences and those of others. These link to the Knowledge and Understanding of the World strand in the EYFS which states:

People and communities: children talk about past and present events in their own lives and in the lives of family members. They know that other children don't always enjoy the same things, and are sensitive to this. They know about similarities and differences between themselves and others, and among families, communities and traditions.

The world: children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.

Throughout the EYFS Learning journey the children will have opportunities through continuous provision to:
Observe seasonal changes inc growth and decay; and explore changes of state
Plant seeds and care for growing plants. Understand the key features of the life cycle of a plant and an animal.
Begin to understand the need to respect and care for the natural environment and all living things.

Subject Knowledge:
To know what floats and sinks
To classify animals into different groups
To know where some animals live (habitats)
To know how to look after our world
To understand what plants need to grow
To observe what happens when things decay and changes over time
Explore different materials and describe them
Observe different seasons

Longitudinal Study – What grows at different points of the year?
Explore and name native plants
Grow and take care of plants

Year 1	Animals including humans	Everyday materials	Plants
	• **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)** • **identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.** HIAS Key ideas/ Subject Knowledge: There are many different animals with differing characteristics. Animals move in order to survive. Animals need food to survive. Animals have senses to help individuals survive. When animals sense things they are able to respond. Different animals move in different ways to help them survive. Know the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets. Learn the names of the main body parts including; head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth. Identify and describe the 5 senses and how they aid survival **Enquiry:** What happens to our bodies when we exercise? Why don't wild animals get fat… or do they?	• **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.** HIAS Key ideas/ Subject Knowledge: There are different materials. Different materials have different properties. Materials have describable properties. (hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent). **Enquiry:** Give children an object and ask them, 'Where should it go?' What materials can you find around the school? Are all plastics hard? Is all wood rough? Make play dough. What materials are best for making a boat for the Gingerbread Man to cross the stream? Make an outfit for Scott the Antarctic explorer (linked to topic). As part of our topic on Scott of the Antarctic, pose the problem: Scott dropped his ____ in a pool of water. The water froze and his ____ is now trapped in a block of ice. He needs to find the quickest way to melt the ice.	• **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.** HIAS Key ideas/Subject Knowledge: Plants usually grow from seeds and bulbs. Plants need warmth, light and water to grow and survive. Plants eventually die. Describe plants as non-flowering and flowering to identify; flowers, petals, stem, leaves, roots, fruit, bulb and seed Identify plants in the local environment including deciduous/evergreen trees **Enquiry:** Do bigger seeds produce larger plants? (Grow sunflowers to show that small seeds can produce big plants.) Find out what the best conditions are to grow cress. Do plants always need soil to grow? Can a plant have too much water? Observe a tree in the school grounds over the school year. How do the seasons affect its growth?

	Go on a blindfolded sensory walk. How would you survive if you lost your sight? Visit from Blind Person and Guide Dog. Can we fool our senses? Life cycle of human/chicken/frog/butterfly. Look for similarities and differences. Watch frogspawn/caterpillars change into frogs/butterflies. Do they all develop at the same rate? Do they all look the same? What do the children think happens next? Food diaries. Compare with pet/wild animal. Design a healthy lunch box/snack.	**Just for fun:** Can you lift a heavy wooden block with thin strips of paper? Which elastic band would make the best catapult?		
	Longitudinal study - KQ- How does my view change out of the window? Link to Seasonal Change • **Observe changes across the four seasons** • **observe and describe weather associated with the seasons and how day length varies.** Pupils might work scientifically by: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change.			
Year 2	**Animals, including humans** • **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.** Key Ideas/Subject Knowledge Animals need a variety of food to help them grow, repair their bodies, be active and stay healthy. Exercise keeps animals' bodies in good condition and increases survival chances. Animals grow until they reach maturity and then do not grow any larger. Animals reproduce new animals when they reach maturity.	**Plants** • **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.** Key Ideas/Subject knowledge Plants usually grow from seeds and bulbs.	**Uses of everyday materials** • **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,**	**Living things and their habitats** • **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 micro-habitats** • **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.** Key Ideas/Subject Knowledge Environmental change can affect the plants and animals that live there.

	All animals eventually die. Explain the life cycle of a butterfly: egg, caterpillar, pupa, butterfly; or frog: spawn, tadpole, frog. Human- baby, toddler, adolescent, adult **Enquiry Ideas:** What happens to our bodies when we exercise? Why don't wild animals get fat… or do they? Life cycle of human/ frog/butterfly. Look for similarities and differences. Watch frogspawn/caterpillars change into frogs/butterflies. Do they all develop at the same rate? Do they all look the same? What do the children think happens next?	Plants need warmth, light and water to grow and survive. Identify and name parts of a plant- petal, stem, root, sepal, stamen, anther, stigma, ovary. Flowering plants make seeds to reproduce and make more plants. Some plants die after producing seeds and others live for many generations **Enquiry ideas:** observe similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy e.g. Where is the 'best' place for a seed to grow? (explore conditions and observe the effect) What happens if you plant a bulb upside down? How do deciduous and evergreen plants reproduce? Do all plants have roots?	**bending, twisting and stretching.** Key Ideas/ Subject knowledge: There are different materials. Different materials have different properties. Materials have describable properties (hard/soft; stretchy/stiff; shiny/dull; rough/smooth; flexible/inflexible; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent). Different materials are suitable for differing tasks. Materials can be changed by physical force (twisting, bending, squashing and stretching). **Enquiry Ideas:** Are all plastics hard? Is all wood rough?	Living things are adapted to survive in different habitats. There is variation between all living things. Different animals and plants live in different places. Some things are living, some were once living but now dead and somethings have never lived. Understand the term 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter). Identify and study a variety of plants and animals within familiar and unfamiliar habitats to observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. For example, on the seashore, in woodland, in the ocean, in the rainforest. Enquiry ideas: Sort and classify things according to whether they are living, dead or were never alive 'e.g. Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions. Investigate and evaluate a simple food chain that includes humans (e.g. grass, cow, human). Explore and describe the conditions in different habitats and micro-habitats (under log, on stony path, under bushes) and find out how the conditions affect the number and type(s) of plants and animals that live there.

			Why are spoons made from different materials? Compare materials and their uses in school and reasons why they are made from those materials What would be the best material to fix the 3rd little pigs hole in his roof (fair test) What new materials have been developed? E.g. John Dunlop, Charles Macintosh or John McAdam.		
	<u>Longitudinal Study KQ- Where is the best place to find mini-beasts in our school? Which season will have the most mini-beasts to find?</u> Animals, including humans (Link Y1 seasonal changes) notice that animals, including humans, have offspring which grow into adults – during different seasons, can the children find any larvae/eggs on leaves to talk about life cycles find out about and describe the basic needs of animals, including humans, for survival (water, shelter food and air) Pupils might work scientifically by: observing, through video, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions.				
Year 3	**Rocks** • **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**	**Animals inc Humans** • **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.**	**Light** • **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**	**Forces and Magnets** • **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**	**Plants** • **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**

	• **recognise that soils are made from rocks and organic matter** Key Ideas/Subject Knowledge Rocks are naturally occurring Different rocks have different properties and characteristics Fossils are formed in different ways Fossils are evidence of animal and plant life Enquiry Ideas: Which rocks are the hardest? What is the effect of erosion on rocks?	Key Ideas/Subject Knowledge Movable joints connect bones Muscles are connected to bones and move them when they contract. Many animals have skeletons to support their bodies and protect vital organs. Enquiry Ideas: Does the length of your femur affect the distance that you can jump? (data collection) Which animals have skeletons?	**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.** Key Ideas/Subject Knowledge • in order to see there must be lights for us to see. Without light it is dark. • We need light to see things even shiny things. • Explain what happens when light hit objects • Know that transparent materials let light through them and opaque materials don't let light through. • Beams of light bounce off some materials (reflection).	• **predict whether two magnets will attract or repel each other, depending on which poles are facing**. Key Ideas/Subject Knowledge Magnets exert attractive and repulsive forces on each other. Magnets exert non-contact forces which work through some materials. Magnets exert attractive forces on some materials. Magnetic forces are affected by: Magnet strength, Object mass, Distance from object, Object material Enquiry Ideas: Are big magnets stronger than small magnets? What materials affect the strength of a magnet? (Data collection, Fair test)	• **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.** Key Ideas/Subject Knowledge Identify that every part of a plant has a job to do i.e. the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction. Plants have roots to provide support and to draw moisture from the soil and sometimes stems to take water to the rest of the plant. Plants make their own food in their leaves to provide them with energy to grown, repair and reproduce. Leaves absorb sunlight and carbon dioxide The plant makes its food from water and carbon dioxide, using sunlight as energy, in the green parts of plants (mainly leaves). Flowering plants have adapted specific parts to carry out

			• Shiny materials reflect light beams better than non-shiny materials. • Know that light travels in a straight line and that light comes from a source Enquiry: What is the best material to make a shadow puppet? Which material is the most reflective?			pollination, fertilisation and see growth. Seed dispersal improves chances of survival Seeds need the rights conditions to germinate. Seeds contain a food store for the first stages of growth. Enquiry Ideas: How do plants drink? (observation- Daffodil/celery expt with food dye) How much light do plants need to survive? (fair test) What affects the germination of seeds? Does the size of the seed affect the size of the plant?
	<u>Longitudinal Study KQ- Are our shadows longer or shorter at different times of the year?</u> Link to light- measure and compare shadows at different points of the year. Discuss changes in weather and temperature that affects the amount of sun. Sub-question: Does the time of day affect the length of shadows? Chn to measure height and then draw round shadows on playground to measure. Record at different times of the day to measure shadows to investigate at different points of the year.					
Year 4	**States of Matter** • **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,**	**Electricity** • **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**		**Animals inc Humans: Digestive system** • **describe the simple functions of the basic parts of the digestive system in humans**	**Living things and their habitats (classification)** • **recognise that living things can be grouped in a variety of ways** • **explore and use classification keys to help group,**	**Sound** • **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**

	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.** Key Ideas/Subject Knowledge Describing materials and changing materials Materials can be divided into solids, liquids and gases Solids, liquids and gases are described by observable properties Heating causes solids to melt into liquids and liquids to evaporate to gases. Cooling causes gases to condense to liquids and liquids to freeze to solids The temperatures at which given substances change state are always the same	• **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.** Key Ideas/Subject Knowledge Ideas associated with push: A source of electricity (mains or battery) is needed for electrical devices to work Electricity sources push electricity round a circuit More batteries will push the electricity round the circuit faster Ideas associated with resistance and 'push' Devices work harder when more electricity goes through them Ideas associated with resistance:		• **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.** Key Ideas/Subject Knowledge Food is digested in the mouth using teeth and saliva then after travelling down the oesophagus, food broken down further in the stomach and intestines where nutrients go into the blood. The blood takes nutrients around the body. Different animals are adapted to eat different food. Nutrients produced by plants move to primary consumers then to secondary	**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.** Key Ideas/Subject Knowledge Living things can be divided into groups based upon their characteristics Identify and sort vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects. Environmental change affects different habitats differently. Different organisms are affected differently by environmental change. Different food chains occur in different habitats	**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.** Key Ideas/Subject Knowledge Describing how sound moves: Sound travels from its source in all directions and we hear it when it travels to our ears. Sound travel can be blocked. Sound spreads out as it travels. Using the idea of vibration to explain sound Changing the shape, size and material of an object will change the sound it produces. Changing the way an object vibrates changes its sound. Bigger vibrations produce louder sounds and smaller vibrations produce quieter sounds. Sound is produced when an object vibrates.

	When two or more substances are mixed and remain present the mixture can be separated. Some changes can be reversed and some can't Materials change state by heating and cooling. Enquiry Ideas: What is the best way of separating solids? Can you separate solids from mixtures?	Some materials allow electricity to flow easily and these are called conductors. Materials that don't allow electricity to flow easily are called insulators. A complete circuit is needed for electricity to flow and devices to work. Enquiry Ideas: Which materials conduct electricity? What do you need to make a working circuit? How many different ways can you light the bulb?		consumers through food chains. **Teeth** Animals have teeth to help them eat. Different types of teeth do different jobs. Incisors – slicing and cutting, Canines for grip, molars for grinding. Enquiry ideas: How are teeth adapted to what animals eat? Which drinks cause the most damage to our teeth? (fair test)	Human activity significantly affects the environment Enquiry Ideas: What food chains can we find in our school grounds? (observation) Where do plants grow best in the school grounds? (observation)	Faster vibrations (higher frequencies) produce higher pitched sounds Sound moves through all materials by making them vibrate. Enquiry Ideas: What materials make the best ear defenders? Sound search (What do we hear in different parts of the school?)
	<u>Longitudinal Study KQ- How can we predict the weather?</u> Link to measuring a range of aspects including the temperature, wind speed, wind chill and rainfall so that they can discuss how this changes across the year. They will also be using their observation skills to look at cloud formation and coverage.					
Year 5	**Animals inc Humans (Circulatory system)**	**Forces** • **explain that unsupported objects fall towards the Earth because of the force of gravity acting between**	**Earth and space** • **describe the movement of the Earth, and other**	**Living things and their habitats**		**Properties and changes to materials (reversible/irreversible changes)**

	• **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.** Key Ideas/Subject Knowledge Muscles need oxygen to release the energy from food to do work. Oxygen is taken into the blood in the lungs The heart pumps blood through blood vessels to the muscles The muscles take the oxygen and nutrients from the blood	**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.** Key Ideas/Subject Knowledge Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move. Friction is a force against motion caused by two surfaces rubbing against each other Air resistance and water resistance are forces against motion caused by objects having to move air and water out of the way Enquiry: Which surface creates the most/least friction? What are the implications of this for cars?	**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.** Key Ideas/Subject Knowledge Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity. Gravity works over a distance. Know the 8 planets of the system and recall facts about them	**(Plant reproduction, seeds)** • **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.** Key Ideas/Subject Knowledge Identify classification of living things such as micro-organisms, plants and animals can be subdivided Know the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification Flowering plants have adapted specific parts to carry out pollination, fertilisation and see growth. Seed dispersal improves chances of survival		• **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** • **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.** Key Ideas/Subject Knowledge

	The heart pumps blood around the body Oxygen is breathed into the lungs where it is absorbed into the blood Diet, exercise, drugs and lifestyle can have effects on the way the body functions. Enquiry: How does the heart work? What does the heart do?	What is the best shape to pass through water? How do you know? Can you design an air resistant outfit for the RAF?	Know that Earth rotates on its axis to give us day and night. Know that each planet orbits the sun. Explain in simple terms geocentric and heliocentric theories. Stars produce vast amounts of heat and light. All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars. Objects with larger masses exert bigger gravitational forces Objects like planets, moons and stars spin Smaller mass objects like planets orbit large mass objects like stars Enquiry: Which planet has the longest/shortest orbit?	Seeds need the rights conditions to germinate. Seeds contain a food store for the first stages of growth. Enquiry: What affects the germination of seeds? Does the size of the seed affect the size of the plant?		All matter (including gases) has mass Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible. Sometimes mixed substances react to make a new substance. These changes are usually irreversible. Enquiry: Which solutions are reversible? What reactions are irreversible?

			Which planet has the most number of satellites? Which planets could support life?			
	Longitudinal Study KQ- Are we all under the same sky? Link Earth and Moon They will make use of first hand and photographic evidence to analyse the phases of the moon, light pollution, and star charts and constellation change. They will be making use of a range of equipment to take accurate measurements of shadows, daylight hours, and moon and tide comparatives.					
Year 6	**Electricity** • **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** • **use recognised symbols when representing a simple circuit in a diagram.** • **associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit**	**Light** • **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.** Key Ideas/Subject Knowledge Animals see objects when light is reflected off that object and enters their eyes Animals see light sources when light travels from the source into their eyes	**Living things and their habitats** • **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** Key Ideas/Subject Knowledge	**Evolution and Inheritance** • **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**	**Animals inc humans** • **Describe the changes as humans develop to old age.** Key Ideas/Subject Knowledge Different animals mature at different rates and live to different ages Understand changes during puberty Life cycles have evolved to help organisms survive to adulthood Enquiry Which animal as the longest gestational period? **Relationships**	

	• **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.** Key Ideas/ Subject knowledge Identify and use the recognised scientific symbols Batteries are a store of energy. This energy pushes electricity round the circuit. When the battery's energy is gone it stops pushing. Voltage measures the 'push' Current is how much electricity is flowing round a circuit. The greater the current flowing through a device the harder it works When current flows through wires heat is released.	Light reflects of all objects (unless they are black). Non-shiny surfaces scatter the light so we don't see a single beam. Light travels in straight lines Enquiry: How do we see?	Different types of organism have different life cycles Life cycles have evolved to help organisms survive to adulthood Enquiry: How do the invertebrates differ between two different environments? How have these organisms adapted to the environment?	**adaptation may lead to evolution.** • **Fossils provide evidence that Living things have changed over time** Key Ideas/Subject Knowledge Overtime characteristics that are most suited to the environment become increasingly common. Fossils provide evidence that living things have changed over time. Organisms reproduce and offspring have similar characteristics to parents. Variation exists within a population (and between offspring and parents). Competition exists for resources and mates. Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms best adapted to reproduce	Some organisms reproduce sexually where offspring inherit information from both parents Some organisms reproduce asexually by making a copy of a single parent Enquiry: Draw a timeline to indicate stages in the growth and development of humans. Which animal has the longest gestational period? How can some drugs be helpful (in treating illness), and also how some drugs and other substances can be harmful to the human body.	

	The greater the current the more heat is released Enquiry: What happens when we change the number of components in a series circuit?			are more likely to do so. Environmental change can affect how well an organism is suited to its environment. <u>Inheritance</u> Some organisms reproduce sexually where offspring inherit information from both parents. Some organisms reproduce asexually by making a copy of a single parent. Enquiry How have evolved in their habitats? Darwin finches – outdoor investigation		
	<u>Longitudinal Study KQ- How do we change over time?</u> Link evolution and adaptation Measure height of each member of the class during the year to see how much they have grown PSHE opportunity discussing changes and emotions					

Progression of skills for working scientifically

These skills are taught and developed during each Scientific topic with children consistently applying and developing their working scientifically skills.

EYFS	Across Key Stage 1	Across Lower Key Stage 2	Across Upper Key Stage 2
30-50months Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world. • Can talk about some of the things they have observed such as plants, animals, natural and found objects. • Talks about why things happen and how things work. • Developing an understanding of growth, decay and changes over time. • Shows care and concern for living things and the environment. **40-60months** Looks closely at similarities, differences, patterns and change.	• ask simple questions and recognise that they can be answered in different ways • observe closely, using simple equipment • perform simple tests • identify and classify • use their observations and ideas to suggest answers to questions • gather and record data to help in answering questions	• ask relevant questions and use different types of scientific enquiries 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 answer 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 straightforward scientific evidence to answer questions or support their findings	• plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat reading when appropriate • record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • use test results to make predictions to set up further comparative and fair tests • report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identify scientific evidence that has been used to support or refute ideas or arguments

ELG **People and communities:** children talk about past and present events in their own lives and in the lives of family members. They know that other children don't always enjoy the same things, and are sensitive to this. They know about similarities and differences between themselves and others, and among families, communities and traditions. • **The world:** children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.			

Progression of skills

Year	Topic	Key concepts supporting progression
Year 1/ Year 2	Animals including humans	There are many different animals with different characteristics Animals need food to survive Animals need a variety of food to help them grown, repair their bodies, be active and stay healthy.

		Animals move in order to survive (animals move in different ways to help them survive Animals grow until they reach maturity Animals reproduce new animals when they reach maturity All animals eventually die Animals have senses to help them survive Exercise keeps animal's bodies in good condition and increases survival chances
Year 3/4	Animals including humans	Different animals are adapted to eat different foods Animals have teeth to help them eat Food is broken down by the teeth and further in the stomach and intestines where nutrients go in into the blood. Nutrients produced by plants move to primary consumers then to secondary consumers through food chains. Many animals have skeletons to support their bodies and protect vital organs Movable joints connect bones Muscles are connected to bones and move when they contract
Year **5/6**	Animals including humans	The heart pumps blood around the body Oxygen is breathed into the lungs where it is absorbed into the blood Muscles need oxygen to release the energy from food to do work Oxygen is taken into the blood in the lungs The heart pumps blood through blood vessels to the muscles The muscles take the oxygen and nutrients from the blood Exercise and diet have an impact on health

Year	Topic	Key concepts supporting progression

Year 1/ Year 2	Forces	Larger masses take bigger pushes and pulls to move or stop them Bigger pushes and pulls have bigger effects Pushing and pulling can make things move faster or slower Pushing and pulling can change the shape of things Pushing and pulling can make things move or stop Things can move in different ways
Year 3/4	Forces	Magnets exert non-contact forces, which work through some materials Magnetic forces are affected by: magnet strength, object mass, distance from object, object material
Year **5/6**	Forces	Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move Friction is a force against motion caused by two surfaces rubbing against each other Air resistance and water resistance are forces against motion caused by objects having to move air and water out of the way.

Year	Topic	Key concepts supporting progression
Year 3/4	Electricity	Electricity powers many common appliances A source of electricity is needed for electrical devices to work Electricity sources push electricity round a circuit A complete circuit is needed for electricity to flow and devices to work Some materials allow electricity to flow easily and these are called conductors. Materials that don't allow electricity to flow easily are called insulators More batteries will push the electricity round the circuit faster

		Devices work harder when more electricity goes through them
Year **5/6**	Electricity	Batteries are a store of energy. This energy pushes electricity round the circuit. When the battery's energy is gone it stops pushing. Voltage measures the 'push' Current is how much electricity is flowing round a circuit The greater the current flowing through a device the harder it works When current flows through wires heat is released. The greater the current the more heat is released
Year	Topic	Key concepts supporting progression
Year 1/ **Year 2**	Plants	Plants usually grow from seeds and bulbs Plants eventually die, they make seeds to reproduce and mare more plants Some plants die after producing seeds, others live for many generations Plants need warmth, light and water to grow and survive
Year 3/4	Plants	Seeds and bulbs need the right conditions to germinate. Seeds contain a food store for the first stages of growth Seed dispersal improves chances of enough seeds germinating and growing to mature plants. Flowering plants have adapted specific parts to carry out pollination, fertilization and seed growth The plant makes its food from water and carbon dioxide, using sunlight as energy, in the green parts of plants Plants have roots to provide support and to draw moisture from the soil and sometimes stems to take water to the rest of the plant. Leaves absorb sunlight and carbon dioxide Plants make their own food in their leaves to provide them with energy, grow, repair and reproduce
Year **5/6**	Plants	Plants reproduce sexually and asexually Different plants have different life cycles

		Life cycles have evolved to help organisms to survive to maturity.

Year	Topic	Key concepts supporting progression
Year 3/ 4	Light	Light comes from a source We need light to see things even shiny things Without light it is dark Shiny materials reflect light beams better than non-shiny materials Beams of light bounce off some materials (reflection) Transparent materials let light through them and opaque materials don't let light through
Year 5/6	light	Animals see objects when light is reflected off that object and enters their eyes Animals see light sources when light travels from the source into their eyes Light reflects off all objects unless they are black. Non-shiny surfaces scatter the light so we don't see a single beam. Light travels in straight lines

Year	Topic	Key concepts supporting progression
Year 5/6	Earth and space	Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity. Gravity works over a distance. Stars produce vast amounts of heat and light. All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars. Objects with larger masses exert bigger gravitational forces

		Objects like planets, moons and stars spin Smaller objects like planets orbit large mass objects like stars

Year	Topic	Key concepts supporting progression
Year 3/4	Sound	Sound moves through all materials by making them vibrate Sound travels from its source in all directions and we hear it when it travels to our ears Bigger vibrations produce louder sounds and smaller vibrations produce quieter sounds Faster vibrations (higher frequencies) produce higher pitched sounds Changing the way an object vibrates changes it's sound Sound moves through all materials by making them vibrate Sound is produced when an object vibrates Changing the shape, size and material of an object will change the sound it produces Sound travel can be blocked Sound spreads out as it travels

Year	Topic	Key concepts supporting progression
Y1/2	Variation and Evolution	Environmental change can affect the plants and animals that live there Living things are adapted to survive in different habitats There is variation between all living things Different animals and plants live in different places
Year 3/4	Variation and Evolution	Living things can be divided into groups based upon their characteristics Human activity significantly affects the environment Different food chains occur in different habitats

		Different organisms are affected differently by environmental change Environmental change affects different habitats differently
Year **5/6**	Variation and Evolution	Living things can be divided into groups based upon their characteristics and that these can be further sub-divided (micro-organisms, vertebrates, invertebrates) Different types of organism have different life cycles Life cycles have evolved to help organisms survive to adulthood Over time the characteristics that are most suited to the environment become increasingly common Fossils provide evidence that living things have changed over time

Year	Topic	Key concepts supporting progression
Y3/4	Rocks	Soils are made from rocks and organic matter Fossils are formed when things that have lived are trapped within rock Different rocks have different physical properties and different appearances
Year	Topic	Key concepts supporting progression
Year 1/2	Materials	There are different materials Different materials have different properties
Year 3/4	Materials (also see associated key concepts from electricity and forces)	Materials can be changed by physical force (twisting, bending, squashing and stretching) Materials can be divided into solids, liquids and gases Solids, liquids and gases are described by observable properties Heating causes solids to melt into liquids and liquids to evaporate to gases Cooling causes gases to condense to liquids and liquids to freeze to solids The temperatures at which given substances change state are always the same

Year 5/6	Materials (also see associated key concepts from electricity and forces)	All matter (including gases) has mass When two or more substances are mixed and remain present the mixture can be separated Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible. Sometimes mixed substances react to make a new substance. These changes are irreversible.