Science Progression Document

This is intended to be a spiral curriculum. Pupils should be taught National Curriculum objectives but should be supported to catch up.

End Points (Threshold Concepts)		Milestones					
		KS 1		Lower KS 2		Upper KS 2	
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Work scientifically (This concept involves learning the methodologies of the discipline of science	• Begin to use simple scientific language (from Y1 PoS) to talk about or record what they have noticed (KS1) • Look/observe closely and communicate changes over time • Look/observe closely and communicate the features or properties of things in the real world. • Observe closely using their senses • Name basic features of objects, materials and living things • Say how things are similar or different	• **Use simple scientific language** from the Y2 PoS to talk about/record what they have noticed • Identifying and Classifying • Asking simple questions. • Recognising they can be answered in different ways (KS1) • Using their observations and ideas to suggest answers to questions (KS1) • Performing simple tests (KS1) • Gathering and Recording data to help in answering questions (KS1) • Observe and **describe (using scientific language)**	• Pupils should read and spell scientific vocabulary correctly and with confidence using their growing word, reading and spelling knowledge (LKS2) • Observe and record relationships between structure and function (linked to Y3 PoS) • **Explore/observe things in the local environment/ real contexts** • Decide ways and give reasons for sorting, grouping, classifying, identifying things/objects • Compare and contrast and begin to consider the relationship between different things (e.g. structure of plants,	• Pupils should read and spell scientific vocabulary correctly and with confidence using their growing word, reading and spelling knowledge (LKS2) • Ask relevant questions and use different types of scientific enquiries to answer them (LKS2). • Setting up simple practical enquiries' comparative and fair tests. (LKS2) • Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables (LKS2)	• Pupils should read, spell and pronounce scientific vocabulary correctly. (UKS2) • Planning different types of scientific enquiries to answer questions including recognising and controlling variables where necessary (UKS2) • Taking measurements using a range of Scientific equipment with increasing accuracy and precision taking repeat readings where appropriate (UKS2) • Recording data and results of increasingly complexity using scientific diagrams and labels classification keys, tables, scatter graph, bar and line graphs (UKS2)	• Pupils should read, spell and pronounce scientific vocabulary correctly. (UKS2) • Planning different types of scientific enquiries to answer questions including recognising and controlling variables where necessary (UKS2) • Taking measurements using a range of Scientific equipment with increasing accuracy and precision taking repeat readings where appropriate (UKS2) • Recording data and results of increasingly complexity using scientific diagrams and labels classification keys, tables, scatter graph, bar and line graphs (UKS2)

		• Compare and contrast simple observable features/ characteristics • Ask simple questions about what they notice about the world around them • Demonstrate curiosity by the questions they ask • Use simple primary and secondary sources (such as photos) to find things out • With help carry out simple tests/comparative test • Talk about ways of setting up a test • Measure using non-standard units e.g. how many lolly sticks, cubes etc • Observe closely using simple equipment • Record simple visual representations of observations made	simple processes/cycles/ changes with several steps • Observe closely and **communicate with increasing accuracy** • Sort and group objects, materials, or living things by observable and or behavioural features • **Raise their own logical questions** based on or linked to things they have observed • **Use simple and appropriate secondary sources** (such as books, photographs, videos etc) to find things out/find answers • Carry out simple comparative tests as part of a group following a method with some independence • With support make suggestions on a method for setting up	functions of plant parts etc) • Begin to understand that some questions can be tested in the classroom and some cannot • Within a group suggest relevant questions • **Find things out using a range of secondary sources of information** • Begin to make some decisions about an idea within a group from a list of choices • Help to decide about how to set up a simple fair test and begin to recognise when a test is not fair • **Make a prediction based on everyday experiences** • **Collect data from their own observations and measurements using notes/ simple tables/ standard units** • **Use equipment accurately to improve the detail of their measurements/ observations**	• Making systematic and careful observations and where appropriate taking accurate measurements using standard units using a range of equipment such as data loggers and thermometers (LKS2) • Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions (LKS2) • Reporting on findings from enquiries, including oral and written explanations, display or presentations of result and conclusions (LKS2) • Gathering and recording classifying and presenting data in a variety of ways to help in answering questions (LKS2)	• Using test results to make predications to set up further comparative fair tests (UKS2) • Reporting and presenting findings from enquiries including conclusions, casual relationships and explanations of and a degree of trust in results in oral and written forms such as displays and other presentations (UKS2) • Identifying scientific evidence that has been used to support or refute ideas or arguments (UKS2) • **Use their developing scientific knowledge** and understanding and relevant scientific language and terminology to discuss, communicate and explain their observations • Suggest reasons for similarities and differences • Decide which sources of information, equipment or test to help identify and classify	• Using test results to make predications to set up further comparative fair tests (UKS2) • Reporting and presenting findings from enquiries including conclusions, casual relationships and explanations of and a degree of trust in results in oral and written forms such as displays and other presentations (UKS2) • Identifying scientific evidence that has been used to support or refute ideas or arguments (UKS2) • Use correct scientific knowledge and understanding and relevant scientific language to discuss their observations and explorations linked to Y6 PoS • Recognise the importance of classification to the scientific world and for a conclusion from their sorting and classifying • Compare and contrast things beyond their

			a simple comparative test • Measure using both non standard and simple standard measures e.g. cm, time with increasing accuracy • Correctly and safely use equipment provided • Record simple data with some accuracy • With guidance, begin to notice patterns in their data Give a simple logical reason why something happened • With help/scaffolds begin to ask questions such as 'what if?...' • **To use scientific vocabulary** to explain their observations and make conclusions or predictions.	• **Record and present findings using simple scientific language and vocabulary** • With help, look for changes and simple patterns in their data, chart, graph • Use their results to consider whether they met their predictions • Draw a simple conclusion to answer their original question	• Identifying differences, similarities or changes relating to simple scientific ideas and processes (LKS2) • Use results to suggest improvements, new questions and /or predictions for setting up further tests(LKS2) • Discuss ideas and develop descriptions from their observations using relevant scientific language from Y4 PoS • Observe and record relationships between structure and function or between different parts of a process • Use guides or simple keys to classify/identify animals, flowering and non-flowering plants • Ask/raise their own relevant questions with increasing confidence and	• Independently ask their own scientific questions taking some ownership for finding out the answers • Find out how scientific ideas have changed/ developed over time • Articulate and explain findings from their research using scientific knowledge and understanding • Suggest more than one possible prediction justifying their reason with some knowledge and understanding of the concept • Make their own decisions about what observations to make or measurements to use and how long to take them for (recognising the need for repeat readings on some occasions) • Record data and results of increasing complexity using different formats e.g. tables, annotated scientific diagrams, classification keys, graphs and models	locality and discuss advantages/ disadvantages, pros/ cons of the similarities and differences • Refine a scientific question to make it testable • Independently ask a variety of scientific questions and decide the type of enquiry needed to answer them • Identify variables to change, measure and keep the same in order for the test to be fair Decide whether to repeat any readings and justify the reason for doing so • Use equipment fit for purpose to take measurements that are increasingly accurate and precise • Identify patterns in results collected and describe them using the change and measure variables (causal relationships) • Independently form a conclusion which draws on the evidence form the test

					independence that can be explored/ observed/ tested or investigated further • Choose/select and relevant question that can be answered by research. experiment /test • Make decisions about which information to use from a wide range of sources and make decisions about how to present their research • Start to make their own decisions about the most appropriate type of science enquiry they might use to answer scientific questions • Explain their planning decisions and choices • Begin to identify what data to collect • Begin to select the most useful ways to collect, record, classify and and present data from a range of choices • Notice/ find patterns in their	• Describe straightforward patterns in results linking cause and effect • Draw a valid conclusion (explain why it happened) based on their data and observations • Begin to recognise how repeated readings improve the reliability of the result	• Describe how to improve planning to produce more reliable results • Make a hypothesis with a developing understanding of the scientific concept. • Independently plan investigations and explain planning decisions. • Predict what a graph might look like before collecting results • Evaluate Risks and act on suggestions to control/reduce risks to themselves and others Use observations to suggest further testable or researchable questions that demonstrate a good understanding of the science concepts • Have access to people from in the local community to access their knowledge and interview in related science roles increasing their science capital. • Be able to identify anomalies in results and use their knowledge of science concepts to

					observations and data and describe the effect of one thing on another		explain potential reasons for these
Biology	**Plants** (This concept involves becoming familiar with different types of plants, their structure and reproduction)	• 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. • Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat	• 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 • Suggest plants that could be used for different purposes and **explain** their suitability in different environments.	• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. • **Explore a range of outdoor environments.** • 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.			

	Animals including humans (This concept involves becoming familiar with different types of animals, humans and the life processes they share)	• 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). • Structure: head, body, way of moving, senses, body covering, tail • Group together animals according to their different features	• 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. • To suggest and explain how they can maintain a healthy lifestyle.	• 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. • An adequate and varied diet is beneficial to health (Along with a good supply of air and clean water). Create a healthy meal (eat well plate). regular and varied exercises from a variety of different activities is beneficial to health (focus on energy in vs energy out) • Identify that humans and some other animals have skeletons and muscles for support, protection and movement. • Identify animals (vertebrates) which have a skeleton that	• 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. • (Link with types of teeth and eating)	• Describe the changes as humans develop to old age. • Pupils should draw timelines to indicate the stages in the growth and development of humans and learn about the changes experienced in puberty	• 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 (in the long term and short term) • Describe the ways in which nutrients and water are transported within animals, including humans. • Pupils should build on their learning from years 3 and 4 about the main body parts and organs to explore and answer questions that helps them understand how different systems enable the body to function • Pupils should learn how to keep their bodies healthy and how their bodies might be damaged-including how some drugs and other substances can be harmful to the human body.

		• Recognise similarities between animals • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.		supports their body, aids movement and protects vital organs (e.g. name and locate skull, backbone, ribs, bones for movement/limbs, pelvis)			• Pupils might work scientifically by exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health. • Understand how the circulatory system allows the body to function (the double pump/oxygen delivery) • To label the inside structure of the heart and investigate through practical experiences • To understand the difference between the three types of blood vessels and how they function. • demonstrate through modelling a clear understanding of how balanced diets support the body with growth and repair • Pupils can use ICT effectively in researching/collecting/interpreting data

	Living Things and Their Habitats (This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes.)		• 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.		• 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. • Use and make identification keys for plants and animals (Pupils should explore examples of human impact (both positive and negative) on environments)	• 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. **As part of the study of observing life cycles** • Name, locate and describe the functions of the main parts of the reproductive systems of plants (stigma, stamen, petal, sepal, pollen, ovary) • Pupils should observe the life cycle changes in a variety of living things, for example plants in the vegetable garden or flower border • Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants • Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire, and excrete	• 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 **As part of the study of evolution and inheritance** • Identify how plants are adapted to suit their environment in different ways and that adaptation may lead to evolution • Give reasons for classifying plants and animals based on specific characteristics. • The symbiotic relationship between plants and animals in a given environment can be explained using the correct scientific vocabulary (more advanced food webs) • Compare a varied range animals that live in extreme conditions and able to identify how they have adapted over time to enable survive

			• Observe living things in their habitats during seasonal changes • Give reasons why a living thing can or can't survive in a certain habitat. • Raise and answer questions that help them to become familiar with the life processes of all living things • Observe and note how living things depend on each other				• Look for relationships between environmental factors and reasons for extinctions of species • Recognise the importance of classification in the scientific world and form conclusions from their sorting and classifying. • To label the inside structure of the heart and investigate through practical experiences • To understand the difference between the three types of blood vessels and how they function. • Demonstrate through modelling a clear understanding of how balanced diets support the body with growth and repair • Pupils can use ICT effectively in researching/collecting/interpreting data
	Evolution and inheritance (This concept involves						**As part of the study of evolution and inheritance, building on what they have**

	understanding that organisms come into existence, adapt, change and evolve and become extinct.)						**learnt about fossils in year 3, pupils should;** • Identify how plants are adapted to suit their environment in different ways and that adaptation may lead to evolution • 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 • To explore how genes and chromosomes work. • To identify and understand the terms gene and chromosome. • Analyse specific animal and plant adaptations in detail. • Understand that some features are inherited and others are environmental. • Able to identify positives and negatives

							with selective breeding in animals they are familiar with and can debate these for different audiences

Chemistry	**Materials** (This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed)	**Everyday materials** • 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.	**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. • Compare how things move on different surfaces. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. • Devise a test to investigate which material would be best for a purpose • Explore how some materials are found naturally and how others have to be made	**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. • Recognise that soils are made from rocks and organic matter. • Recognise that rocks and soils can feel and look different and can be different in different places/ environments	**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, 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.	**Properties and changes of materials** • Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, transparency, solubility, 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 change as reversible/irreversible giving examples of each reasoning why this change occurs identify that a chemical change takes place in irreversible reactions and explain these using simple mathematical equations showing where the chemical changes have taken place • Begin to name some elements and the chemical symbol for them. • Be aware of the 'Periodic Table' as a means to sorting the elements. • Explore simple exothermic and endothermic chemical reactions. • Demonstrate through modelling an understanding of different techniques used in separating mixtures.

						• Compare a variety of materials and measure their effectiveness • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Recognise everyday situations where dissolving occurs • 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, oxidisation and the action of acid on bicarbonate of soda.	

Physics	**Forces and Magnets** (This concept involves understanding what causes motion)			• Compare how things move on different surfaces. • Notice that some forces need contact between 2 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 2 poles • Predict whether 2 magnets will attract or repel each other, depending on which poles are facing. • Pupils should observe that magnetic force can act without direct contact, unlike most forces		**Forces** • 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. • Understand there are different types of forces (push, pull, friction, air resistance, water resistance, magnetic forces and gravity) which have different effects on objects • Understand that gravity can act without direct contact between the Earth and an object • Know and explore how forces can be useful or unwanted	• To understand that more than one force can act on an object simultaneously (either reinforcing or opposing each other). • Understand there are different types of energy (kinetic friction, static friction etc) • Plan and carry out tests relative to questions posed exploring water resistance, air resistance and vacuums • To understand forces can be measured (Newtons) and record simple examples of force measurement. • Understand that the effects of friction, air resistance and water resistance can be reduced or increased for a preferred effect and can link examples to real life applications.

	Light (This concept involves how light and reflection affect sight)			• 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.			• **Pupils should build on the work on Light in Year 3, exploring the way that light behaves including light sources, reflection and shadows, they should talk about what happens and make predictions** • 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. • Explore and observe a range of light

							phenomena such as rainbows, bubbles, refraction through water • Research and model how some light phenomena occur. • Be able to use technical terminology accurately and precisely. • Investigate the relationships between light sources, objects and shadows recording observations and measurements. • Use models to demonstrate their understanding of more abstract concepts such as how light travels in straight lines e.g. making periscopes and link these to real life uses
	Sound (This concept involves understanding how sound is produced, how it travels and how it is heard)				• Identify how sounds are made, associating some of them with something vibrating. • Recognise that vibrations from sounds travel through a medium		• Measure frequencies of sounds in hertz. • Link experiments to real life applications and the need for protection against sound. • Make a hypothesis where they state how one thing will affect another and give a reason for their

					to the ear exploring sounds travelling through different mediums and that sound can be blocked • Find patterns between the pitch of a sound and features of the object that produced it and understand that the pitch of a sound can be altered • 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.		suggestion with a developing understanding of the scientific concept e.g. how sound proofing absorbs the sound • Compare the auditory range of humans and animals • Research the ways that sounds can be used in the animal kingdom e.g. Bats and soundwaves for echolocation
	Electricity (This concept involves understanding circuits and their				• Identify common appliances that run on electricity.		**• Building on their work in Year 4, pupils should construct simple circuits to help them answer**

	role in electrical applications)				• 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.		**questions about what happens when they try different components eg switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols.** **• Pupils are expected to learn only about series circuits, not parallel, pupils should be taught to take necessary precautions for working safely with 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

					• Explore how faults in a circuit can be found by methodically testing connections		• Use recognised symbols when representing a simple circuit in a diagram. • Use/interpret circuit diagrams to construct a variety of more complex circuits predicting whether they will work. • Uses a systematic approach in identifying the effects of changing components in a circuit. • investigate/ explore parallel circuits and compare them to series circuits • Can identify real life applications where circuits are used (in a wide range of settings). • Use their knowledge of circuits to design/create/invent a useful circuit e.g. traffic lights, burglar alarm.
	Earth and Space (This concept involves understanding what causes seasonal changes, day and night)	**Seasonal Changes** • Observe and describe changes across the four seasons. • Observe and describe weather associated with the				**Earth and Space** • Describe the movement of the Earth, and other planets, relative to the Sun and each other in the solar system.	• Can discuss lightyears as a unit of astronomical distance • Uses a range of mathematical concepts to calculate results around relative distance of planets

		seasons and how day length and temperature varies.				• 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.	• compares day lengths on other planets and looks for patterns to explain these. • Identify evidence that supports their ideas surrounding the movement of the Earth. • Compares day length at different times of the year in different hemispheres and presents the data using appropriate methods e.g. tables and graphs. • interprets data identifying patterns and using the data to draw reasoned conclusions,
By the end of Year 6, a good scientist will have: • The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings. • Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations. • Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings. • High levels of originality, imagination or innovation in the application of skills. • The ability to undertake practical work in a variety of contexts, including fieldwork. • A passion for science and its application in past, present and future technologies. • An understanding of how science is used in the world around them and have built up strong science capital experiences							

National Curriculum National Curriculum Expectations Above and beyond the national curriculum

Steps to National Curriculum **Cultural Capital**