

Science Curriculum Progression

'The important thing is to never stop questioning' – Albert Einstein

Curriculum Intent:

At Milldown CE Academy, we are committed to providing a high-quality science education for all our children. By doing so we will equip them with the knowledge and cultural scientific skills they need to succeed beyond the school gates, in the wider world. Underpinning all lessons will be a rigorous focus on developing and securing scientific skills whilst also ensuring sound progression of knowledge and sequenced understanding of key concepts. Our core aims are:

- To be <u>inspired</u> to be inquisitive, critical thinking scientists who can ask, answer, test, analyse and draw conclusions about key concepts and natural phenomena
- To have their <u>beliefs</u> challenged and widened through secure scientific knowledge and understanding and the opportunity to work and think as a scientist;
- To <u>achieve</u> excellent standards in science, using detailed scientific language to talk confidently and coherently about known scientific concepts.

How will the curriculum be delivered? The implementation.

As per our teaching and learning policy, the approach taken with all subjects is to ensure that memory is strengthened at all opportunities. As Kirschner, Sweller and Clarke (2006) stated: "Learning is a change in the long term memory. If nothing has been changed in the long term memory then nothing has been learned."

In science, lessons and teaching follows a mastery approach as shown below. We work on the principle that all learners, with effort and excellent teaching, will meet expectations. Where possible and appropriate, links are made between scientific learning and our wider curriculum themes and Christian values, encouraging deeper thinking and reflection. Our drivers – critical thinking, communication and challenge – are woven through this approach.

Spaced	Activating Prior	Learning	Anchor task –	<u>I do – We do</u>	You do	Evaluation of
Retrieval.	Learning	question –	expose concept,	Explicit explaining,	Independent	learning.
	Кеу	where does	pull out knowledge	modelling and	practice	
	Concept(s) –	this fit with the	& misconceptions.	narrating the	Application of	
	identify & link.	big picture?		metacognitive	strategy /	
				process.	learning.	

The exact knowledge to be learnt is set out for staff in detailed medium term plans and for children via a knowledge organiser. Throughout their learning journey, children summarise their learning in their own 'book of knowledge' by creating their own knowledge organiser. This gives children a platform from which to orally rehearse prior learning and link to new knowledge. It also serves as means of self- and peer-quizzing to help ensure knowledge becomes embedded in long-term memory.

Curriculum Review (Impact):

To complement our pupil led knowledge organisers children will answer a 'BIG' question often in an essay-style response. To answer this question, knowledge from each lesson will need to be thought about. During assessment weeks, children will also complete a quiz. Scores from this are tracked throughout the year and used by teachers and leaders to focus future teaching and retrieval. Select questions from each historical unit studied throughout the year form part of a larger, end of year summative quiz. Because our curriculum serves as the progression model, the level of success in these quizzes shows the degree of impact. This will also be judged following pupil discussions by subject and curriculum leaders.

Science Curriculum Progression

	National Curriculum	Working Scientifically	Vocabulary
EYFS	 The Natural World Children at the expected level of development will: Explore the natural world around them, making observations and drawing pictures of animals and plants; 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. 	Ask how and why questions Show curiosity and question why things happen. Observe and describe what they see using everyday language Explain ideas clearly. Record learning in a table. Planning simple test Predict what will happen.	 Badger, owl, fox, rabbit, squirrels, hedgehogs, earthworms, beetles, slugs, snails nocturnal, shelter, sett, nest, den, warren, drey, wild, forest, bamboo, meat eaters, paws, fur, hibernate, spring, summer, autumn, winter, evergreen. dinosaur, reptiles, herbivore, omnivore, carnivore, bones, skeletons, extinct, mountain, volcano, lava, eruption Hot, cold, melting, freezing, temperature, leopards, lions, rhinoceros, elephants, buffalo, penguins, kangaroos, koalas, habitat. Frogspawn, tadpole, froglet, frog, cycle, float, sink, experiment Farm, crops, harvest, wheat, flour, warmth, air, water, soil, vegetables, fruits, healthy, horse, rabbit, goat, cow, sheep, duck, goose, hen, pig, donkey, bull, turkey, pork, beef, lamb, udders,
Year 1	Plants • 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. • Identify and name the roots, trunk, branches and leaves of trees. Animals including humans • • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • 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 Seasons • • Observe changes across the four seasons • Observe and describe weather associated with the seasons and how day length varies. • Distinguish between and object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, metal, plastic, glass, 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 properties	Ask simple questions and recognising that they can be answered in different ways Observe closely, using simple equipment, e.g. magnifying glass 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 Label a picture/diagram Describe the properties of materials Sort materials using their properties Test evidence to answer a question	leg, wings, antennae, lifecycle, incubator Leaves, trunk, branch, root, seed, bulb, flower, blossom, stem, stalk, wild, garden, deciduous, evergreen, observe, , magnifying glass, record, equipment, blossom, bark, bud Amphibians, birds, fish, mammals, reptiles, carnivores, herbivore, omnivore, sight, hearing, touch, taste, smell, head, neck, ear, mouth, shoulder, hand, fingers, leg, foot, thumb, eye, nose, knee, toes, teeth, elbow, backbone (spine), tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves Seasons, spring, summer, autumn, winter, windy, sunny, snowy, overcast, snow, rain, temperature, day, length, sun, sunrise object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through.
Year 2	<u>Plants</u>	Ask simple questions and recognise that they can be	Leaves, trunk, branch, root, seed, bulb, flower, blossom stem stalk bark wild garden
L	1		Diossoff, sterr, stark, bark, wild, galaett,

	 Observe and describe how seeds and bulbs grow into mature plants. Find out and describe how plants need water, light and warmth to grow and stay healthy. Animals Know that animals, including humans, have offspring which grow into adults Find out 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. Know the basic stages in a life cycle for animals, including humans. Living things and their habitats Explore and compare the difference 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 the different sources of food. 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 shapes of solid objects made from some materials can be changed by squashing, bending, twisting 	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	deciduous, coniferous, germinate, evergreen, observe, grow, compare, record, temperature, predict, measure, diagram, germinate, warmth, sunlight, cool, nutrients, climate. Living, dead, never alive, food, leaf litter, shelter, sea shore, woodland, ocean, rainforest, conditions, desert, damp, shade, toddler, teenager, offspring, young, grow, nutrition, reproduce, hygiene, survival Living, dead, never alive, habitats, micro- habitats, suited/suitable, food, food chain, leaf litter, shelter, sea shore, woodland, ocean, rainforest, conditions, desert, damp, shade, adaptation, consumer, producer, prey, herbivore, omnivore, carnivore wood, plastic, glass, metal, water, rock, brick, paper, fabric, card, rubber, suitable/unsuitable, use/useful, hard/soft, stretchy/stiff. Rigid/flexible, waterproof/absorbent, strong/weak, rough/smooth, transparent/opaque, shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching.
Year 3	Plants	Make relevant predictions that will be tested in a	Air light water putrients soil support
	 Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers Explore the part flowers play in a flowering plants life cycle, including: pollination, seed formation and seed dispersal Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants Know the way in which water is transported between plants Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat. Know how nutrients, water and oxygen are transported within animals and humans. Know about the importance of a nutritious, balanced diet. Identify that humans and some other animals have skeletons and muscles for support, protection and movement: 	Scientific enquiry Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry Use a range of equipment to measure accurately, including thermometers, rulers and stopwatches Ask relevant 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	 An, nght, water, homerins, soli, support, reproduction, pollination, pollen, dispersal, transportation, flower, energy, growth, seedling, carbon dioxide, oxygen, sugar, material, photosynthesis, chlorophyll, seed formation, absorb, nutrients, stamen, style Nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic skeleton, vertebrates, invertebrates, muscles, contract, relax, Force, push, pull, twist, contact force, non- contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnetic material, metal, iron, steel, poles, north pole, south pole

	 Know how a simple pulley works and use making lifting an object simpler Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract and 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 with attract or repel each other, depending on which poles are facing. Light Recognise that they need light in order to see things and that dark is the absence of light. Notice 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 a solid object. Find patterns in the way that the sizes of shadows change. 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 	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. Use results to draw simple conclusions, make predictions for new values, suggest improvements, and raise further questions. Identify differences, similarities or changes related to simple scientific ideas and processes. Use straightforward scientific evidence to answer questions or to support their findings.	Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent. Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb, water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil.
	 Recognise that soils are made from rocks and organic matter 		
Year 4	 Animals 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. Living things and their habitats 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 avariety of living things in their local and wider 	Ask relevant questions and using 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, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers	Herbivore, Carnivore, Digestive system, digestion, tongue, mouth, saliva, teeth, oesophagus, stomach, gall bladder, small intestine, pancreas, large intestine, liver, anus, tooth, canine, incisor, molar, premolar, decay, carnivore, herbivore, omnivore Environment, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation, air pollution, water pollution, producer, producer, pagative (pagitive migrate
	 environment. Recognise that environments can change and that this can 	Gather, record classify and present data in a variety of ways to help in answering questions	predator, prey, negative/positive, migrate, hibernate
	 sometimes pose danger to living things. Construct and interpret a variety of food chains, identifying producers, predators and prey 	Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	Electrical, appliance, mains, plug, circuit, component, cell, battery, positive, negative, connect/connectors, loose connection, short
	Electricity Identify common appliances that run on electricity. Construct a simple series electrical circuit identifying and	Report on findings from enquiries, including oral and written explanations, displays or presentations	circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol, voltage, current.
	naming its basic parts, including cells, wires, bulbs, switches	of results and conclusions	
	 Consider a simple series circuit 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 	of results and conclusions Use results to draw simple conclusions, make predictions for new values, suggest improvements	Sound, source, vibrate, vibration, travel, pitch, volume, faint, loud, insulation, wave

	 series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors. Know the difference between a conductor and an insulator; giving examples of each. Safety when using electricity. Sound Know how sound is made associating some of them with vibrating. Know what happens to a sound as it travels from its source to our ears. Know the correlation between the volume of a sound and the strength of the vibrations that produced it. Know how sound travels from a source to our ears. Know the correlation between pitch and the object 	to simple scientific ideas and processes Use straightforward scientific evidence to answer questions or to support their findings.	air, oxygen, ice, water, water vapor, steam, heated, heat, cooled, cool, temperature, degrees Celsius, melt, melting point, freeze, freezing point, solidify, boil, boiling point, evaporate, evaporation, condense, condensation, precipitation, infiltration
	 producing a sound. <u>Materials</u> Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature 		
Year 5	 Animals including humans Describe the changes as humans develop from birth to old age. Living things and their habitats Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird. Know the differences between different life cycles. Know the process of reproduction in plants. Know the process of reproduction in animals. Forces Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives. Identify the effects of air resistance, water resistance and friction, which act between moving surfaces. Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. Earth and space Describe the movement of the Earth, and other planets, relative to the Sun in the solar system Describe the Sun, Earth and Moon as approximately spherical bodies Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. 	Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary 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 readings 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 a 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 Evaluate different aspects of their enquiries such as	 Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional, reproduction, cell, fertilisation, , male, female, pregnancy, young, mammal, death, menstrual cycle Life cycle, live, young, fertilises, egg, runners, reproduce, sperm, metamorphosis gestation, cuttings, plantlets, bulb, sexual/asexual reproduction Force, Gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears, Newton, up thrust, opposing, streamline, brake, cog, weight, mass. Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, crescent, gibbous. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical, geocentric, heliocentric. Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice,

•	Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. 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.	Use scientific language and illustrations to discuss, communicate and justify scientific ideas.	evaporation, water vapour, energy, precipitation, collection, mixture, solution, dissolve, soluble/insoluble, filter, sieve, reversible, irreversible
Living th Electricit	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 how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc. including humans 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. 1 and inheritance Know how fossils can be used to find out about the past. 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- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago ings and habitats Classify living things into broad groups according to observable characteristics and based on similarities and differences. Give reasons for classifying plants and animals based on specific characteristics. 19 Associate the bightness 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 bightness of bulbs, the loudness of buzzers and the on/off position of switches. Use recognised symbols when representing a simple circuit in a diagram.	 Pidn dillerent types of scientific enquines to driswer questions, including recognising and controlling variables where necessary Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate 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 Evaluate different aspects of their enquiries such as equipment and accuracy of measurements. Use scientific language and illustrations to discuss, communicate and justify scientific ideas. Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. 	Light, light source, dark, dosence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous, refraction, medium, dense Oxygenated, Deoxygenated, Valve, Exercise, Respiration Circulatory system, transport, heart, lungs, blood vessels, blood, artery, vein, pulmonary, alveoli, capillary, digestive, transport, gas exchange, villi, nutrients, water, oxygen, alcohol, drugs, tobacco. Fossils, Adaptation, Evolution, Characteristics, sexual reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence, offspring, characteristics, adapted, suited, species, acquired characteristic, genes, natural selection, artificial selection Variation Organisms Populations. Classification Characteristics Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation. Classify, compare, bacteria, microorganism, organism, invertebrates, vertebrates, Linnaean. Electricity, neutrons, protons, electrons, nucleus, atom, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, conductor.

Science Key Concept Progression

Science is a discipline dedicated to explaining the natural world. Scientists seek to understand and explain the natural world and phenomena. When investigating, their thinking is developed by a number of **big organising ideas and generalisations known as concepts**. These concepts form a unique framework of enquiry and shape the questions that scientists investigate. There are three disciplines in science (biology, chemistry and physics) and these concepts across them.

	Biology					Chemistry			Physics													
	7 Life Processes Organisms are organised on a cellular basis and have a finite life span	Nutrition Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms	Reproduction Genetic information is passed down from one generation of organisms to another	Diversity or classification The diversity of organisms, living and extinct, is the result of evolution	Materials All matter in the made of very sr Properties of Materials	Universe is nall particles Changing Materials	The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate Earth and Space Our solar system is a very small part of one of billions of galaxies in the Universe		The composition of the Earth and its atmosphere and the processes occuring within them shape the Earth's surface and its climate Earth and Space Our solar system is a very small part of one of billions of galaxies in the Universe		The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate Earth and Space Our solar system is a very small part of one of billions of galaxies in the Universe		The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate Earth and Space Our solar system is a very small part of one of billions of galaxies in the Universe		The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate Earth and Space Our solar system is a very small part of one of billions of galaxies in the Universe		The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate Earth and Space Our solar system is a very small part of one of billions of galaxies in the Universe		The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate Earth and Space Our solar system is a very small part of one of billions o galaxies in the Universe		Energy The total amount of energy in the Universe is always the same but can transferred from one energy store to another during an event	Contact Forces Changing the movement of an object requires a net force to be acting on it Non-Contact Forces Objects can affect other objects at a distance
EYFS	Explore the natural	world around them,	making observatio	ons and drawing	Understand som processes and o including chang matter.	ne important changes ging states of	Underst	and seasonal changes														
KS1	Living and non- living Label human body Human health	Habitats Food chains Growing plants	Animal growth	Name and describe common animals Name and describe common plants	Everyday Materials Suitability of materials for uses	Force to change materials	Se	asonal changes	Seasonal changes	Pushes and Pulls												
Lower KS2	Human movement	Environmental change Animal nutrition Human digestive system Animal food chains	Flowering plants and reproduction	Classification Keys	States of matter	Heating and cooling	Ro	cks and soils	Light Electricity Sound	Forces and magnets Friction												
Upper KS2	Human circulation system and healthy lifestyle	hy healthy lifestyle life hy healthy lifestyle life hy healthy lifestyle life in ar hc cy		Classifying plant and animals Adaptation and evolution		Reversible and irreversible changes Mixing solutions Separating solutions	Day and Orbit of Orbit of	d night earth moon	Light Electricity	Gravity Gearing Resistance and friction												

Scientific enquiry

Research Pattern seeking		Observing over time	Testing	Identifica classific	tion and cation	Problem solving
			542	C		(?)
End of EYFS		End of K\$1	End of LKS2	2		End of UKS2
 Ask how and why questions Show curiosity and question why thin happen. Observe and describe what they set using everyday language Explain ideas clearly. Record learning in a table. Planning simple test Predict what will happen. 	 Asking sir recognis answere Observin equipme Performir Identifyir Using the suggest of Gatherin in answere 	mple questions and ing that they can be d in different ways g closely, using simple ant ing simple tests ig and classifying bir observations and ideas to answers to questions g and recording data to help ring questions.	 Asking relevant questions different types of scientific answer them Setting up simple practice comparative and fair test Making systematic and cobservations and, where taking accurate measure standard units, using a rai equipment, including the and data loggers Gathering, recording, clap presenting data in a varie to help in answering quess Recording findings using scientific language, draw labelled diagrams, keys, b and tables Reporting on findings from including oral and written explanations, displays or p of results to draw simp conclusions, make predicivalues, suggest improvem raise further questions Using straightforward scie evidence to answer ques support their findings. 	and using c enquiries to al enquiries to areful appropriate, ements using nge of rmometers assifying and ety of ways stions simple rings, par charts, n enquiries, boresentations is thons for new nents and milarities or e scientific ttions or to	 Planning di enquiries to including re variables w Taking med of scientific increasing taking repe appropriat Recording increasing diagrams of keys, tables line graphs Using test re to set up fut tests Reporting of from enqui causal rela of and deg oral and w displays an Identifying has been u ideas or are 	fferent types of scientific o answer questions, ecognising and controlling where necessary assurements, using a range equipment, with accuracy and precision, eat readings when e data and results of complexity using scientific and labels, classification s, scatter graphs, bar and esults to make predictions of the comparative and fair and presenting findings ries, including conclusions, tionships and explanations gree of trust in results, in ritten forms such as d other presentations scientific evidence that used to support or refute guments.

Scientific Concepts

	Pattern										
When anything repeat	ts itself in a predictable way e.g. behaviour, do	ata. Scientists use this information to help make	predictions or explain.								
End of EYFS	End of KS1	End of LKS2	End of UKS2								
 Observe and interact with natural processes, such as ice melting, a sound causing a vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object and a boat floating on water. 	 With guidance, they should begin to notice patterns and relationships and begin to give reasons, e.g. seasons 	Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them, e.g. water cycle, shadows changing, pitch of sound & material	 Identify patterns that might be found in the natural environment, e.g. phases of the moon, intensity of exercise on heart rate Look for different causal relationships in their data, e.g. different surfaces effect moving objects in different ways (link to friction, gravity, air resistance) 								

	Change											
	When something beco	omes	different from its original form and the ass	ocia	ted scientific processes that may have tak	ken p	place to cause this.					
	End of EYFS		End of KS1		End of LKS2		End of UKS2					
•	Throughout the year, observe the natural world, e.g. weather	•	Observe changes over time, e.g. seasons, weather, deciduous trees/plants, growth of animals	•	Through suggesting ways in which to carry out observations over time, can identify change and use scientific vocabulary to give reasons for this, e.g. heating and cooling of water	•	Observations over time lead to reasoned predictions that are then tested further using comparative tests and fair tests to find out more, e.g. investigating the conditions in which mould grows					

	Classification											
	How things can be grouped or sorted according to different characteristics or criteria.											
End of EYFS End of KS1 End of I					End of LKS2		End of UKS2					
•	Can recognise and describe some plants and animals they see, identifying some similarities and differences	•	Know that materials and living things can be organised and grouped into categories, e.g. vertebrates and invertebrates.	•	Know some criteria for classifying and use simple keys.	•	Use and develop keys and other information records to identify, classify and describe living things and materials with greater detail.					

	Cause and effect										
			The why and the what; the com	binc	ation of action and reaction.						
	End of EYFS		End of KS1		End of LKS2		End of UKS2				
•	Observe and interact with natural processes, such as ice melting, a sound causing a vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object and a boat floating on water.	•	Understand that when something changes an impact can be seen (e.g. changing materials, weather)	•	Know that causes can be investigated and the effect can be measured Recognise when a simple fair test is necessary and help to decide how to set it up when investigating cause and effect	•	Understand that more than one variable can cause an effect/the same effect, e.g. increasing force and increasing gradient will cause an object to move further Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why				

Compare and contrast							
The identification and justification of similarities and differences							
End of EYFS	End of KS1	End of LKS2	End of UKS2				
 Describe some similarities and differences between living things, e.g. food eaten, habitats, body parts 	 Ask questions about the similarities and differences between things Use simple features and first hand observations to compare and contrast objects, materials, living things and, with help, decide how to sort and group them. 	 Use observations to identify, through the use of increasingly complex tools such as simple keys. With support, be able to reason and justify when explaining how they have chosen to group things. Use knowledge of properties and behaviours of materials and living things to compare and contrast them. 	 Use observations to identify, through the use of classification keys and other secondary sources. To be able to reason and justify when explaining how they have chosen to group things. To design simple tests to help them classify materials, e.g. soluble/insoluble To compare and contrast their ideas with scientific principles. 				

	Structure and function							
The component parts that make up a living thing and how each part serves to support survival.								
End of EYFS		End of KS1		End of LKS2		End of UKS2		
•	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, e.g. all plants have roots and need water to survive	•	Know there is a wide variety of living things (organisms), including plants and animals. Know that living things are distinguished from non-living things by their ability to move, reproduce and react to certain stimuli. Identify how Living things are suited to their environment, e.g. fish have gills and fins to allow them to live underwater	•	Describe and explain that to survive, living things need water, air, food, a way of getting rid of waste and an environment which stays within a particular range of temperature.	•	Know that at some stage all living things carry out the life processes of respiration, reproduction, feeding, excretion, growth and developments and all will eventually die Explain how living things have adapted over time to survive in their environment	

	Variation								
	The differences between living things of the same species – inherited or environmental.								
	End of EYFS	End of KS1		End of LKS2			End of UKS2		
•	Explore the natural world around them, making observations and drawing pictures of animals and plants, noticing some similarities and differences	•	Understand that there are many different kinds of plants and animals in the world today Identify how offspring are similar to their parents	•	Know there are many different kinds of plants and animals in the world today; many kinds that once lived but are now extinct and that we know about these from fossils. Understand animals and plants are classified into groups and subgroups according to their similarities.	•	Know organisms of the same species breed more of the same. Know that although organisms of the same species are very similar, they vary a little from each other due to genetics. Know one of the results of sexual reproduction is that offspring are never exactly like their parents. Know some plants produce clones of the parent Due to evolution, understand that living things have changed over time to best suit their habitat/environment		