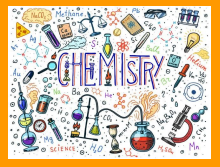
Science Curriculum Progression
St Julian's Church School

Purpose and Aims of our Science Curriculum:

At St Julian's School we recognise the importance of Science in every aspect of daily life. Our Science curriculum aims to give all children a strong understanding of the world around them whilst acquiring specific skills and knowledge to help them to think scientifically, to gain an understanding of scientific processes and also an understanding of the uses and implications of Science, today and for the future. As one of the core subjects taught in Primary Schools, we give the teaching and learning of Science the prominence it requires. The children are exposed to a wide variety of topics which fall under the three main disciplines of biology, chemistry and physics. The biological thread of plants, animals and humans runs across all year groups; building and developing children's understanding as they move through the school. This begins with identification of animals and their habitats, and progresses to food chains , life cycles and environmental impacts upon the natural world. Children are also taught in detail about the human body, its processes and how it functions. The chemistry and physics units cover a broad spectrum of topics including space, forces, state of matter, light and electricity among others. As with our whole school curriculum, we will make meaningful links where appropriate. For science these links may be with the study of our local area,geography, design technology or PSHE.

Within the disciplines of science we have identified the 'big ideas' (or threshold concepts) that help children to link old learning to new learning. These big ideas are:

BIOLOGY	CHEMISTRY	PHYSICS
		
Plants Animals and humans Living things Evolution and inheritance	Materials (incl. rocks and soils and states of matter)	Movement, forces and magnets Light and seeing Sound and hearing Electricity Earth in space

Our science lessons aim to be practical and interactive, teaching knowledge through using and applying the skills of scientific enquiry, enabling children to ask and answer scientific questions with confidence and accuracy. Specialist vocabulary for topics is taught and built up, and effective questioning to communicate ideas is encouraged. Science units/lessons are based around problems or questions that need solving or answering scientifically.

Our 'big ideas' of scientific enquiry are:

Working scientifically	1. Asking Questions 2. Comparative and fair testing 3. Observing over time 4. Pattern seeking 5. Identifying, classifying and grouping 6. Research using secondary sources

To ensure children 'catch up' following the disruption of the Coronavirus pandemic our 2-year cycle has been revised to revisit any missed content. Units will start with recap and revision to ensure that children are secure in essential prior knowledge before moving on.

Science Curriculum Progression
St Julian's Church School

The National Curriculum and Early Years Breadth of Study in Science

	EYFS	KS1		KS2			
	Reception	**Year 1 / Year 2**		**Year 3 / Year 4**		**Year 5 / Year 6**	
Key skills of scientific enquiry		Pupils should learn to answer scientific questions using a variety of approaches including: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data.					
		● asking simple questions and recognising that they can be answered in different ways ● observing closely, using simple equipment ● performing simple tests ● identifying and classifying ● using their observations and ideas to suggest answers to questions ● gathering and recording data to help in answering questions		● asking relevant questions and using different types of scientific enquiries to answer them ● setting up simple practical enquiries, comparative and fair tests ● making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers ● gathering, recording, classifying and presenting data in a variety of ways to help in answering questions ● recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables ● reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions ● using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions ● identifying differences, similarities or changes related to simple scientific ideas and processes ● using straightforward scientific evidence to answer questions or to support their findings.		● planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary ● taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate ● recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs ● using test results to make predictions to set up further comparative and fair tests ● reporting and presenting 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 ● identifying scientific evidence that has been used to support or refute ideas or arguments	
Knowledge		Plants Animals, including humans Seasonal changes Everyday materials	Plants Animals, including humans Living things and their habitats Uses of everyday materials	Plants Animals, including humans Rocks Light Forces and magnets	Animals, including humans Living things and their habitats Sound Electricity States of matter	Living things and their habitats Animals, including humans Properties and changes of materials Earth and space Forces	Living things and their habitats Evolution and inheritance Animals including humans Light Electricity

Science Curriculum Progression
St Julian's Church School

Our 2-year Cycle Long Term Overview in Science (How we have organised the N.C. Breadth of Study)

Cycle A 2021 - 2022

EYFS Breadth of Study	**Theme**						
	Key learning						
Year 1&2 Breadth of Study		Animals including humans - Looking at animals	Everyday Materials (Y1)	Animals including humans - looking at humans		Plants (Y2)	Living things and their habitats (Y2)
Year 3&4 Breadth of Study		States of Matter (Y4)	Electricity (Y4)	Sound (Y4)	Investigations/ Science Week	Animals, including humans (human body, nutrition, teeth and digestion) (Y3 & Y4)	
Year 5&6 Breadth of Study		The Earth and Beyond (Y5)		Electricity (Y6)	Living things and their habitats - life cycles (Y5)	Properties and changes of materials (Y5)	Animals including humans (Y5) Human development

Cycle B 2022 - 2023

EYFS Breadth of Study	**Theme**						
	Key learning						
Year 1&2 Breadth of Study		Use of everyday Materials (Y2)	Seasonal Changes Part 1 (Y1)	Seasonal Changes Part 2 (Y1)	Animals including humans - using our senses & staying healthy	Plants (Y1)	Seasonal Changes Part 3 (Y1)
Year 3&4 Breadth of Study		Rocks and soils (Y3) (paleontology)		Light and Dark (Y3)	Forces and magnets (Y3)	Living things and their habitats (Y4)	Plants and growth (Y3)
Year 5&6 Breadth of Study		Forces (Y5)	Sound (revision from Y4)	Light (Y6)	Animals including humans - Blood and the Circulatory system (Y6)	Living things and their habitats - classification (Y6)	Evolution and inheritance (Y6)

Science Curriculum Progression
St Julian's Church School

Meaningful links in our Science curriculum

	EYFS-R	KS1 1 - Year 1 and Year 2						LKS2 - Year 3 and Year 4						UKS2 - Year 5 and Year 6					
Cycle A		Animals including humans (Y1)	Everyday Materials (Y1)	Animals including humans (Y2)		Plants (Y2)	Living things and their habitats (Y2)	States of Matter (Y4)	Electricity (Y4)	Sound (Y4)		Animals, including humans (human body, nutrition, teeth and digestion) (Y3 & Y4)		The Earth and Beyond (Y5)		Electricity (Y6)	Living things and their habitats - life cycles (Y5)	Properties and changes of materials (Y5)	Animals including humans (Y5) Human development
linked Text (whole school driver)																			
Links to our whole school themes																			
Cycle B		Use of everyday Materials (Y2)	Seasonal Changes Part 1 (Y1)	Seasonal Changes Part 2 (Y1)	Animals including humans (revision of Y1 & Y2)	Plants (Y1)	Seasonal Changes Part 3 (Y1)	Rocks and soils (Y3) (paleontology)		Light and Dark (Y3)	Forces and magnets (Y3)	Living things and their habitats (Y4)	Plants and growth (Y3)	Forces (Y5)	Sound (revision from Y4)	Light (Y6)	Animals including humans - Blood and the Circulatory system (Y6)	Living things and their habitats - classification (Y6)	Evolution and inheritance (Y6)
linked Text (whole school driver)																			
Links to our whole school themes																			

Science Curriculum Progression
St Julian's Church School

Our Progression Model in Science (summary of key knowledge and scientific enquiry skills linked to our Big Ideas)

NB bulleted points are directly from National Curriculum; highlighted knowledge is identified as prerequisite essential or linked knowledge that is built into our progression model

Big Idea		EYFS- R	KS1 1 - Year 1 and Year 2	LKS2 - Year 3 and Year 4	UKS2 - Year 5 and Year 6
Biology 	***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, including trees • 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	• 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 • 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	• *Relate knowledge of plants to studies of evolution and inheritance.* • *Relate knowledge of plants to studies of all living things.*
	key conceptual vocabulary 		Deciduous, Evergreen trees, Leaves, Flowers (blossom), Petals, Fruit, Roots, Bulb, Seed, Trunk, Branches, Stem, Bulbs, Water, Light, Temperature, Growth	Air, Light, Water, Nutrients, Soil, Reproduction, Transportation, Dispersal, Pollination, Flower	*Recap and revisit all previously learned vocabulary within other biology units*
	Possible enquiries 		**Observing over time**: How does a plant change as it grows? **Pattern seeking**: Explore the relationship between a seed/bulb size and the gown plant **Comparative and fair test:** Do cress seeds grow better inside or outside? **Identify, classify and group: How can we** sort these plants? **Research using Secondary Sources**: which trees grow in our local area?	**Observing over time:** How does water travel up a plant stem? What does cress need in order to grow well? **Pattern Seeking**: How do growing conditions affect seed germination? **Comparative and fair test**: Investigate the effect of temperature/light/moisture on how well a plant grows. **Identify, classify and group:** Identify and label the different parts of a plant **Research using Secondary Sources**: investigate pollination and the part bees and other insect play	
	Animals and		• identify and name a variety of common animals including fish,	• identify that animals, including humans, need the right types and	• describe the changes as humans develop to old age

Science Curriculum Progression
St Julian's Church School

	Humans		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 • 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	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 • 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	• 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 conceptual vocabulary 		fish, amphibian, reptile, bird, mammal, goldfish, tropical fish, budgerigar, parrot, rabbit, gerbil, hamster, mouse, chinchilla, lizard, snake, dog, cat, tail, paws, legs, feet, nose, ears, eyes, feather, fur, scales, fins, fish, tail, gills, scales, eyes, mouth, bill, beak, head, eye, legs, claws, wings, feather, down quill, webbed feet, legs, smooth skin, big eyes and mouth, nose, scaly skin, claws on feet, long tongue, big teeth, mackerel, trout, hake, sea bass, whitebait, flat fish, plaice, robin, blackbird, blue tit, hawk, peacock, seagull, magpie, eagle, jump, hop, leap, climb, clamber, swing, pad, pace, prowl, pounce, spring, flap, fly, flutter, flop, splash, splosh, dive, swim, slither, slide, hedgehog, fox, bat, badger, night, nocturnal, senses, sight, smell, sonar,	Movement, Muscles, Bones, Skull, Nutrition, Skeletons, Mouth, Tongue, Teeth, Oesophagus, Stomach, Small Intestine, Large Intestine, Herbivore, Carnivore, Canine, Incisor, Molar, producer, predator, prey, food chain	Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Circulatory, Heart, Blood Vessels, Veins, Arteries, Oxygenated, Deoxygenated, Valve, Exercise, Respiration

Science Curriculum Progression
St Julian's Church School

			food, feeding, roost, sett, burrow, tunnel, nest, hospital, surgery, nurse, vet, patient, care, look after, treat, accident, injury, injured, illness, sick, medicine, bandage, stethoscope, gloves, face mask, overalls, cow, sheep, pig, horse, pony, goat, duck, chicken, cockerel, goose, harvest mouse, barn owl, rabbit, cat, dog, moo, baa, oink, neigh, bleat, quack, cluck, cock-a-doodle-do, honk, squeak, purr, miaow, woof, eat, healthy, meat, insects, fish, vegetables, plants, trees, grass, seeds, nuts, carnivore, herbivore, omnivore, goat, beard, hoof, hooves, horns, troll, ugly, big eyes, big pointed ears, big nose, big mouth with sharp teeth, small, medium, big, smallest, biggest, dinner, meal, meat, lamb, beef, ham, chicken, vegetables, plants, trees, bushes, grass, menu, hamper, appetite Fish, Reptiles, Mammals, Birds, Amphibians (+ examples of each) Herbivore, Omnivore, Carnivore, Leg, Arm, Elbow, Head, Ear, Nose, Back, Wings, Beak, Survival, Water, Air, Food, Adult, Baby, Offspring, Kitten, Calf, Puppy, Exercise, Hygiene		
	Possible enquiries 		**Observing over time**: How do our bodies change over time? **Pattern Seeking**: Just because we are older are we taller/bigger? Do our different body parts grow as we get older? **Identify, classify and group:** Group and classify animals by what they eat or their type of animal. Describe and compare different types of fish. **Research using Secondary Sources**: Which part of the body uses taste/hearing etc? Research using Secondary Sources: Why do we need exercise?	**Observing over time**: Which liquid is the least healthy for our teeth? **Pattern Seeking**: How are the teeth of an animal related to the type of food they eat? **Identify, classify and group:** Use a classification key to group and sort these animals **Research using Secondary Sources**: What job do our muscles do? What food group does XXX belong to?	**Observing over time**: How are nutrients and water transported in the body? **Pattern Seeking**: How does exercise affect your heart rate? **Research using Secondary Sources**: find out about the circulation system using simulation programmes

Science Curriculum Progression
St Julian's Church School

			Research using Secondary Sources - name and identify body parts of different animals. Name nocturnal animals.		
	Living things		• 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 / *specific habitats*	• 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 • 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 conceptual vocabulary 		Living, Dead, Habitat, Energy, Food chain, Predator, Prey, Woodland, Pond, Desert	Vertebrates, Fish, Amphibians, Reptiles, Birds, Mammals, Invertebrates, Snails, Slugs, Worms, Spiders, Insects, Environment, Habitats	Mammal, Reproduction, Insect, Amphibian, Bird, Offspring, Classification, Vertebrates, Invertebrates, Micro-organisms, Amphibians, Reptiles, Mammals, Insects
	Possible enquiries 		**Observing over time:** Observe a minibeast habitat over time eg a wormery **Pattern Seeking:** How is an animal's body suited to its habitat? (could link to using secondary sources too as a starting point) Do all animals with webbed feet live on or in water? **Identify, classify and group: Group living things by their habitat** **Research using Secondary Sources**: Who lives in the Arctic/Antarctic? Make a food chain using the animals in the Gruffalo. What animals	**Observing over time:** Use secondary sources to notice how a specific habitat has changed over time eg arctic ice, rainforests **Pattern Seeking:** Why have I grouped the animals in this way? **Identify, classify and group:** explore and use a classification key in order to name living things **Research using Secondary Sources:** What do animals in the African grasslands eat?	**Observing over time**: What conditions are needed for bread to go mouldy? **Pattern Seeking:** Can you find a plant or animal that have charactiercias for more than one classification group? **Identify, classify and group:** classify living things and describe how they have been grouped **Research using Secondary Sources:** find out which microorganisms are helpful in our daily lives and why

Science Curriculum Progression
St Julian's Church School

			live in an oak tree? What does a XXX need to survive?		
	Evolution and inheritance		• *Identify how humans resemble their parents in many features.* *When will we teach this building block? PSHE CHanging Me unit*	• *Identify how plants and animals, including humans, resemble their parents in many features.* • *Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago* • *Identify how animals and plants are suited to and adapt to their environment in different ways.* *When will we teach this building block? Science Living things and Plants*	• recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution
	key conceptual vocabulary 		humans, animal, parent, child, off-spring	likeness, features, habitats, environment	Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics
	Possible enquiries 				**Pattern Seeking**: Are all animals / plants adapted to the environment in which they live? **Research using Secondary Sources:** What contribution did … Mary Anning make to how we understand the importance of fossils? What impact has Charles Darwin had on how we think about evolution? How have animals adapted to live in the XXX habitat? Which bird beak has adapted best for which type of bird food?
Chemistry 	***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	• compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • *Relate the simple physical properties of some rocks to their formation (igneous or sedimentary)* • describe in simple terms how fossils are formed when things that have lived are trapped within *sedimentary* rock	• 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

Science Curriculum Progression
St Julian's Church School

			• identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	• recognise that soils are made from rocks and organic 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	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 conceptual vocabulary 		materials, wood, wooden, plastic, metal, glass, water, rock, brick, paper, writing, wrapping, shiny, drawing, display, greaseproof, kitchen towel, handkerchief, wallpaper, sand paper, fabric, wool, nylon, silk, fleece fibre, properties, hard, soft, fluffy, rough, smooth, shiny, dull, light, heavy, transparent (see-through), opaque (can't see-through), translucent (see something through), harder, lighter, rougher, stretch, stretchy, elastic, stiff, bend, bendy, not bendy, press, squash, twist, shape, waterproof, absorb, absorbent, soak up, mop up; frozen, freeze, melt, salt, tissue paper, button, glass bead, marble, pebble, pasta	Fossils, Soils, Sandstone, Granite, Marble, Pumice, Crystals, Absorbent, igneous, sedimentary, metamorphic solid, liquid, hard, soft, pour, flow, pile, pool, surface, horizontal, runny, viscous, sticky, grain, powder, ice, water, temperature, cool, cooling, warm, warming, hot, degree Celsius, melt, melting, freeze, freezing, solidify, solidifying, heating, states of matter, change of state, melting point, freezing point, process, gas, air, carbon dioxide, helium, oxygen, bubbles, empty, particle, weight, compress, squash, shape, volume, dry, evaporate, evaporation, water vapour, boil, boiling, boiling point, steam, thermometer, data logger, sensor, droplets, condense, condensation, water, droplets, cycle, model, snow, expand, scale, calibrate, heat sensitive, sensor	Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing
	Possible enquiries 		**Patterns seeking:** Is metal always rigid? Are rocks always hard? Are shiny materials always waterproof? **Comparative & Fair testing**: What material is best to build a dragon house from? (comparative). Which material mops up the 'wee' best (school dog)? (comparative) Which materials are the most stretchy / flexible; absorbent / waterproof?	**Observing over time:** Describe the effect of temperature, shape and size on how fast ice blocks melt **Pattern Seeking:** What do the patterns in rocks tell about how they were formed? What are different soils made from? **Comparative & Fair testing:** Which type of soil absorbs the most water? How can we dry this fabric (evaporation)	**Observing over time:** How does salt/sugar dissolve in water? How can it be recovered? **Pattern seeking:** How does the temperature of the liquid affect the speed or amount of solid that dissolves? **Comparative & Fair testing**: Can you stop this ice cube from melting? Which material insulates best?

Science Curriculum Progression
St Julian's Church School

			Identify, classify and group: sort and group materials according to their properties. sort and group objects by the materials they are made **Research using Secondary Sources:** use photos to discover how different materials are used in our world.	**Identify, classify and group:** Classify rocks by their tryp. Group food into different food groups. Compare the boiling point of different liquids. **Research using Secondary Sources**: How are fossils formed? Explain the water cycle	**Identify, classify and group:** Identify materials that can undergo reversible changes and those that cannot. **Research using Secondary Sources:** find out how sieving, dissolving, chemical reactions are used in the 'real' world
Physics 	***Movement, forces and magnets***		• *Notice and describe how things move, using simple comparisons such as faster and slower.* • *Compare how different things move.* *When will we teach this building block?* *DT Roly Poly?*	• 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	• *Describe magnets as having two poles.* • *Predict whether two magnets will attract or repel each other, depending on which poles are facing.* • 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 • *Describe, in terms of drag forces, why moving objects that are not driven tend to slow down.* • *Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs* • recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect
	key conceptual vocabulary 		move, fast, faster, slow, slower	Magnetic, Force, Contact, Attract, Repel, Friction, Poles, Push, Pull	Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys
	Possible enquiries 			**Pattern seeking**: Are all metals magnetic? Do all metals conduct electricity? **Comparative and Fair Testing:** Which magnet is the strongest? On which surface will this car travel the fastest/furthest?	**Pattern Seeking**: How does the height of a ramp affect how the car travels along? What is the relationship between the size of a gear/[pulley/lever and the effort required to move an object

Science Curriculum Progression
St Julian's Church School

				Identify, classify and group: identify and group materials according to those which are attracted by a magnet **Research using Secondary Sources:** find out how magnets are used in the 'real' world	**Comparative & Fair testing**: How does the type of string or straw used affect the distance travelled by a balloon? (fair) How does the shape of an object (ie boat or parachute or helicopter) affect the time it takes to travel through water or air? (fair) **Identify, classify and group:** Identify the force acting on the object **Research using Secondary Sources:** find out how forces and mechanics are used in the 'real' world
Light and Seeing			• *Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes.* *When will we teach this building block?*	• 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	• 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 conceptual vocabulary 			light, dark, electrical light, flame, sun light, see, travel, eye	Light, Shadows, Mirror, Reflective, Dark, Reflection, transparent, translucent, opaque	Refraction, Reflection, Light, Spectrum, Rainbow, Colour
Possible enquiries 				**Observing over time:** How do shadows change over the day? Make a sundial to measure time. **Pattern Seeking:** What is the link between the object's distance from a light source and its shadow? **Comparative & Fair testing**: What is the best material to block out UV light? (comparative) What is the best material to reflect light? (comparative)	**Comparative & Fair testing:** How does the angle that a light ray hits a plain mirror affect the angle at which it reflects off the surface? **Research using Secondary Sources:** find out how our eyes see

Science Curriculum Progression
St Julian's Church School

				Identify, classify and group: Group light sources. Group items that reflect/don't felct. Group materials as transparent, translucent or opaque. **Research using Secondary Sources:** find out how to stay safe in the sun ie how to view an eclipse	
	Sound and Hearing		• *Observe and name a variety of sources of sound, noticing that we hear with our ears.* *When will we teach this building block?*	• identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear Sound is a Y4 unit but the following are assessed within milestone 3: • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases	Revisited in Y5/6 as a revision unit • identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear Sound is a Y4 unit but the following are assessed within milestone 3: • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases
	key conceptual vocabulary 		sound, ear, names some sources of sound	Volume, Vibration, Wave, Pitch, Tone, Speaker	Volume, Vibration, Wave, Pitch, Tone, Speaker
	Possible enquiries 			**Pattern Seeking:** What is the difference in sound patterns in different items? **Comparative & Fair testing**: How does distance from the source effect the volume of the sound? (fair) Which material makes the most effective sound proofing for a music studio? (comparative) **Research using Secondary Sources**: How are sounds made?	**Pattern seeking**: What is the relationship between the strength of vibrations and the volume of a sound? **Comparative & Fair testing**: Which material makes the most effective sound proofing for a music studio? (comparative) **Research using Secondary Sources:** Find out how the ear hears

Science Curriculum Progression
St Julian's Church School

	Electricity		• *Identify common appliances that run on electricity* • *Know and understand that a battery can run down if left on and that some batteries are rechargeable.* • *Construct a simple series electrical circuit* *When will we teach this building block? CT to talk to SL to decide.*	• identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors	• 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
	key conceptual vocabulary 		electrical, electricity, electric, circuit, appliance	electricity, electrical, mains, plugged in, battery, power, rechargeable, solar, wind up, sound, light, heat, movement, cell, wire, bulb, bulb holder, buzzer, motor, component, circuit, complete circuit, short circuit, flow, break, make, metal, connect, disconnect, terminal, positive, negative, switch, press switch, toggle switch, tilt switch, pendulum switch, property, electrical conductor, electrical insulator, electron, filament, sets, Venn diagram, Carroll diagram, table, conclusion, evidence, annotate	Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators, Amps, Volts, Cell
	Possible enquiries 			**Pattern Seeking**: What are the effects of adding different/more components / switches to a simple series circuit? **Comparative and fair testing:** Which material conducts electricity best? **Identify, classify and group:** group conductors and insulators of electricity; group electrical products according to their electrical source **Research using Secondary Sources:** investigate the symbols used in electoral circuit diagrams	**Pattern seeking:** What are the effects of adding more components in a parallel circuit? **Comparative & Fair testing:** Does increasing the voltage affect the brightness of the bulb? (fair) **Research using Secondary Sources:** What contribution did … Michael Faraday make to electricity? Using an image with symbols, make this circuit.
	Earth in Space		• observe changes across the 4 seasons	• *Describe the movement of the Earth relative to the Sun in the solar system.* • *Describe the movement of the Moon*	• describe the movement of the Earth and other planets relative to the sun in the solar system

Science Curriculum Progression
St Julian's Church School

			• observe and describe weather associated with the seasons and how day length varies • *Observe the apparent movement of the Sun during the day.*	*relative to the Earth.* *When will we teach this building block- Light and seeing unit. Eclipse*	• 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 conceptual vocabulary 		Summer, Spring, Autumn, Winter, Sun, Day, Moon, Night, Light, Dark	light, dark, shadow, solar system, Earth, sun, moon	Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, gravity, sphere/spherical, planets and names of each planet, solar system, eclipse, shadow Aldebaran, Arctic, Antarctic, British Summer Time, Earth, Greenwich Meridian, International Date Line, Jupiter, Mars, Mercury, Milky Way, Moon, North Pole, Saturn, South Pole, Sun, Neptune, Universe, Uranus, Venus, asteroid, autumn, axis, compass, crescent, dawn, degrees, dusk, equator, equinox, fixed stars, Full Moon, galaxy, gibbous, hemisphere, horizon, illuminate, leap year, longitude, lunar month, meridian, nebula, New Moon, northern, orbit, planet, reflect, rotate, rotation, solar system, solstice, southern, spin, spring, star, summer, sunrise, sunset, telescope, temperature, tilt, time zone, waning, waxing, winter, year
	Possible enquiries 		**Observing over time**: How do habitats change over the seasons? What happens to trees in each season? **Pattern Seeking**: How does the length of daylight in a day change throughout the year?		**Pattern Seeking**: How does the Earth's rotation cause night and day? **Observing over time**: How does the Earth's rotation cause shadows to change during the day? **Research using Secondary Sources**: How close / far away are the planets in our solar system away from the sun?
Working scientifically	***Asking Questions***		While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they	The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions.	Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry.

Science Curriculum Progression
St Julian's Church School

			answer these questions. The children answer questions developed with the teacher often through a scenario. The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered, including - observing changes over time, noticing patterns, grouping and classifying, carrying out simple comparative tests, finding things out from secondary sources).	The children answer questions posed by the teacher. The children explore everyday phenomena and the relationships between living things and familiar environments. They begin to develop their ideas about functions, relationships and interactions. Children raise their own questions about the world around them. Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question. Children make some decisions about which types of enquiry will be the best way of answering questions including observing changes over time, noticing patterns, grouping and classifying, carrying out simple comparative and fair tests, finding things out using secondary sources.	Children explore and talk about ideas, ask their own questions about scientific phenomena, analyse functions, relationships and interactions more systematically. They begin to recognise more abstract ideas and begin to recognise how these ideas help them to understand how the world operates. They begin to recognise scientific ideas change and develop over time. Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question (including observing changes over different periods of time, noticing patterns, grouping and classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.) They choose a type of enquiry to carry out and justify their choice.
	key vocabulary 		what, how, why, when, question, observe, pattern, test, measure, compare	previous vocab plus… enquiry, function, relationship, notice, group, classify, answer	previous vocab plus… scientific phenomena, analyse, systematic, abstract, theory, justify
	Comparative and fair testing  *NB. a fair test is performed by changing a variable that is quantitative; a comparative test is*		Children discuss ideas about how to find things out and/or how to answer a scientific question generated by themselves or a teacher. Children carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time. They gather and record data to help in answering questions. Children can say what happened / what they found out in an investigation and record and communicate findings in a range of ways.	Children can suggest and set up simple practical enquiries. Children can plan and carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. Children recognise when a simple fair test is necessary and help to decide how to set it up. Children can think of more than one variable factor. Children recognise when a simple comparative test is necessary and help to decide how to set	Children can suggest, plan and set up practical investigations, tests or observations in order to explore and answer a scientific enquiry. Children can decide when it is appropriate to do a fair test or a comparative test. They explain which variables need to be controlled and why. Children record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables and bar and line graphs. Children can make the decision on how to best record data from a choice of these familiar approaches.

Science Curriculum Progression
St Julian's Church School

	performed by changing a variable that is qualitative		Children can show results in a table (could be provided) Children can say whether they were surprised at the results or not and what they would change about their investigation.	it up. Children can think of more than one variable factor. They gather, record, classify and present data in a variety of ways to help in answering questions. Findings are recorded using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. Children use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Using straightforward scientific evidence to support their findings, children can report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.	They 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. Draw conclusions based on their data and observations, use evidence to justify their ideas, use scientific knowledge and understanding to explain their findings. Children know which evidence proves a scientific point. Children use test results to make predictions to set up further comparatives and fair tests. They suggest improvements to their method and give reasons.
	key vocabulary 		question, find out, answer, 'change one thing', predict, 'what do you think will happen', compare, observe, pattern, results, happened, table, measure, record, graph, chart ● I would like to find out? ● How will I do this? ● What will I measure or observe? ● What will I change? ● What must I keep the same? ● What do I think will happen? ● What have I noticed? ● What does this tell me? ● What will I do differently next time?	previous vocab plus... enquiry, fair test, comparative test, variable factor, gather, record, measure, diagrams, prediction, improvement, conclusion, evidence, explain ● Question: I would like to find out? ● Method:How will I do this? ● Variables: What will I measure or observe? What will I change? What must I keep the same? ● Prediction: What do I think will happen? ● Results: What have I noticed? ● Conclusion: What does this tell me? ● Evaluation: What could I do differently next time? What else would I like to find out next?	previous vocab plus… control, relationships, reliability, accuracy, interpret, justify, prove, ● Question/Enquiry ● Method ● Variables ● Prediction ● Results ● Conclusion ● Evaluation

Science Curriculum Progression
St Julian's Church School

	Observing over time 		While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. Children can say what they are looking for and what they are measuring. Children observe closely using the appropriate senses, aided by simple equipment such as magnifying glasses, digital microscopes, egg timers Children know how to use simple equipment safely and with increasing independence They begin to take measurements, initially by comparisons, then using non-standard units. They begin to progress from non-standard units, reading mm, cm, m, ml, l, °C The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs.	Children help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. They can choose from a selection of equipment and learn to use it safely, independently and appropriately (eg data loggers). They make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. They observe and measure accurately using standard units including time in minutes and seconds. The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). Children are supported to present the same data in different ways in order to help with answering the question.	Children make their own decisions about what observations to make, what measurements to use and how long to make them for and whether to repeat them. The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. They take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate. Measurements are accurate and precise – N, g, kg, mm, cm, mins, seconds, cm^2V, km/h, m per sec, m/ sec Graphs – pie, line, bar (Year 6) Children can make a set of observations and say what the interval and range are. During an enquiry, children make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).
	key vocabulary 		measure, equipment, record, results, observe, compare, describe, compare, similar, different, unit measurements	previous vocab plus... notice, patterns, observations, careful, accurate, evidence, increase, decrease, predict, conclude, relationships, appearance, unit measurements	previous vocab plus… accuracy, precision, unit measurements

Science Curriculum Progression
St Julian's Church School

	Pattern seeking 		Children observe changes over time and, with guidance, begin to notice patterns and relationships. They can use observations and ideas to suggest answers to questions	Children begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. With help, children can look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. Children can say what they found out, linking cause and effect. With support, children can identify new questions arising from the data, make new predictions and find ways of improving what they have already done.	Children can identify patterns that might be found in the natural environment. Children can interpret data and find patterns. Children look for different causal relationships in their data and identify evidence that refutes or supports their ideas. children identify results that do not fit the overall pattern
	key vocabulary 		questions, answers, gather, measure, explore, observe, bigger/smaller, longer/shorter, warmer/colder	previous vocab plus... patterns, relationships, cause, effect, data, changes, similarities, differences, predict, question, observations, conclude, improve, investigate further, spiral (fibonacci)	previous vocab plus… causal, interpret, data, graphs and charts, anomaly, atypical, typical, impact
	Identifying, classifying and grouping 		Observe and identify, compare and describe, sort and classify. Children use simple features to compare objects, materials and living things and, with help, decide how to sort and group them. The children recognise 'biggest and smallest', 'best and worst' etc. from their data. Children classify using simple prepared tables and sorting rings	Identify differences, similarities or changes related to simple scientific ideas and processes. Talk about criteria for grouping, sorting and classifying and use simple keys. Compare and group according to behaviour or properties, based on testing. Record classifications eg. using tables, Venn diagrams, Carroll diagrams.	Use and develop keys and other information records to identify, classify and describe living things and materials.
	key vocabulary 		look, notice, observe, compare, describe, similar, different, features, sort, group, notice, biggest/smallest, best/worst, Venn diagram	previous vocab plus... differences, similarities, classify, diagram, chart, key, Carroll Diagram, Venn Diagram, behaviour, properties, criteria, c;lassification key	previous vocab

Science Curriculum Progression
St Julian's Church School

	Research using secondary sources 		Use simple secondary sources to find answers. Can find information to help from books and computers with help	Begin to recognise when and how secondary sources might help to answer questions that cannot be answered through practical investigations	Recognise which secondary sources will be most useful to research their ideas. Identify scientific evidence that has been used to support or refute ideas or arguments. Separate opinion from fact.
	key vocabulary 		find out, look up, investigate, research, photo, website, leaflet, information book	previous vocab plus… secondary source, practical investigation	previous vocab plus… argument, movement, opinion, fact

Suggested assessment of learning tasks in Science

Teachers complete ongoing informal assessments on children's learning that help them to identify gaps in learning which can be addressed promptly. These may be in the form of careful questioning, recall quizzes, mind maps or other assessment for learning tasks.

Within a unit of learning, teachers will select high quality tasks that will enable all pupils to demonstrate what they have learned in the unit. We recognise that the purpose of these tasks is to identify where there is under or over provision for learners so that any problem can be addressed promptly. Therefore teachers know what good learning looks like on a daily basis and over time; and know that it is their understanding of **how** a pupil completes a task or activity enables the pupil to clearly demonstrate **what** they have learned and their **depth** of learning.

KS1

Learning Objective	Key Indicator	Basic	Advancing	Deep
BIOLOGY To understand plants	Identify and name a variety of common plants, including garden plants, wild plants and trees and those classified as deciduous and evergreen.	**What are the names of common wild plants? What are the names of some common garden plants? What are the names of common trees? Which trees are evergreen and which are deciduous? (name)**	**What are the similarities and differences between deciduous and evergreen trees? Think of some ways to categorise plants.**	**Could you suggest a garden design for someone who likes privacy and bright autumn colours?**

Science Curriculum Progression
St Julian's Church School

	Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers.	**What are the names of the parts of flowering plants? What is the structure (names) of each part of a flowering plant?**	**Taking a selection of (real) different flowering plants, what are the structural features? (apply)**	**Are roots always at the bottom of plants (generalise)? Why do you think that is? (explain concept)**
	Observe and describe how seeds and bulbs grow into mature plants.	**Describe the growth of seeds and bulbs**	**What are the similarities and differences in the growth of seeds and bulbs?**	**What might a scientist need to keep in mind when recording information about the growth of seeds and bulbs? (propose)**
	Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	**What do plants need to stay healthy? (describe, list)**	**How could you try to revive these plants? (apply) [Give pupils a dried out plant, one that's been in a fridge, one that's been kept in the dark etc?]**	**How could you devise a way of proving that plants need certain conditions for growth?**
BIOLOGY To understand animals and humans	Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates.	**Name some common animals. Match the animals to the labels birds, fish, amphibian, reptile, mammal and invertebrate.**	**Point out and explain the main differences between birds, fish, amphibians, reptiles, mammals and invertebrates**	**Create a guide to recognising different types of animals.**
	identify and name a variety of common animals that are carnivores, herbivores and omnivores.	**Name some common animals. Label animals as carnivores, herbivores or omnivores.**	**Show how carnivores, herbivores and omnivores are similar and different**	**True or false? (prove) Carnivores are not hunted by other carnivores.**
	Describe and compare the structure of a variety of common animals. (birds, fish, amphibians, reptiles, mammals and invertebrates, including pets)	**Name and label the structures of common animals. Complete tables that compare the structures of common animals.**	**Compare and contrast mammals with amphibians.**	**What evidence would you show to prove that a reptile could not be confused with a mammal?**
	Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense	**Label the main parts of the human body. Illustrate the parts of the body associated with the five senses.**	**Explain why the sense of touch may be important to a blind person.**	**Suggest some adjustments that could be made around school for a blind or deaf person.**
	Notice that animals, including humans, have offspring which grow into adults.	**Name the offspring of animals and humans. (e.g. babies for humans, puppies for dogs) Match the offspring to the adult.**	**Explain the main differences between adult animals and humans and their offspring.**	**Suggest some ways that an animal's offspring (including humans) are dependent, for some time, on adults.**

Science Curriculum Progression
St Julian's Church School

	Investigate and describe the basic needs of animals, including humans, for survival. (water, food and air)	**List the basic needs of animals, including humans, for survival.**	**Compare the types of food that different animals require.**	**Explain the concept of humans' need for clean water and why this is not so important for other animals.**
	Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	**Describe a healthy diet. Describe a healthy lifestyle. Observe and describe the effect of exercise.**	**Categorise food types and explain why each group is important to humans.**	**Create a weekly menu and exercise programme for someone your age.**
BIOLOGY To investigate living things	Explore and compare the differences between things that are living, that are dead and that have never been alive.	**Observe and list the key features of things that are living, dead and that have never been alive. Describe things as living, dead or never been alive.**	**Organise things of your choice into groups: living, dead and never been alive.**	**Give evidence to show that a glass bottle has 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.	**Observe animals/plants in their natural habitats. Match the animal/plant to its habitat. Describe why the animal/plant is suited to its environment.**	**Categorise animals/plants according to the conditions they require. Explain your categories.**	**Suggest reasons why a cactus may find it difficult to survive in cold, wet conditions. Create an ideal environment for woodlice and prove that this is a successful habitat.**
	Identify and name a variety of plants and animals in their habitats, including micro-habitats.	**Match common animals/plants to their habitats**	**Explain why a habitat for a plant or animal is suitable.**	**Design an ideal habitat for a hamster (or other animal that is kept as a pet. Create a bottle garden for plants that require warm, dry conditions.**
	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.	**What does a (name of animal) like to eat? (name) Draw a food chain that ends with a sparrow hawk. Name sources of food.**	**Explain the differences in a food chain for a herbivore and a carnivore.**	**Always, sometimes or never? All food chains end with a carnivore.**
BIOLOGY To understand evolution and inheritance	Identify how humans resemble their parents in many features.	**List the ways that humans may resemble their parents. Match pictures of parents to their children**	**Present similarities and differences between parents and their children.**	**Devise a 'guess who' game to deduce the child of a set of parents.**
CHEMISTRY To investigate materials	Distinguish between an object and the material from which it is made.	**Match an object to its original material. Name the object and its original material.**	**Explain how a bottle is made from sand. Choose some objects and explain how they were made from their original material.**	**True or false? Some fleece jackets start as plastic bottles.**

Science Curriculum Progression
St Julian's Church School

	Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.	**Observe and name everyday materials. Arrange objects made of the same materials and label the materials.**	**Group objects based on the materials they are made from. Explain your groupings**	**Investigate which objects started off as a plant.**
	Describe the simple physical properties of a variety of everyday materials.	**Observe and name the properties of everyday materials. Complete tables that describe the properties of materials.**	**Explain why the properties of materials are useful for deciding which materials to use for an object. Give examples.**	**Design an item of clothing to keep one dry.**
	Compare and group together a variety of everyday materials on the basis of their simple physical properties.	**Place materials into groups under the headings given to you. Describe the different properties of materials.**	**Decide how to group materials on the basis of their properties. Explain your reasons for your groups. Compare and contrast the different properties of materials.**	**Create a 'guess the material' game based on the properties of materials.**
	Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	**Observe and describe changes to the shape of solid objects when they are squashed, bent, twisted or stretched.**	**Experiment with changing the shape of solid objects. Organise and summarise your findings.**	**Always, sometimes or never? The shape of wood can be changed through squashing, bending, twisting or stretching.**
	Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick/rock, and paper/cardboard for particular uses.	**List different uses for everyday materials. List reasons for the suitability of materials for particular uses.**	**Compare and contrast the properties of materials and use this to explain why certain materials are used for particular purposes.**	**Paper is unsuitable for a model boat. Do you agree or disagree (reason, justify) Devise other hypotheses like this and test them**
PHYSICS To understand movement, forces and magnets	Notice and describe how things move, using simple comparisons such as faster and slower.	**What happens to objects when they are pushed? What happens to objects when they are pulled?**	**Experiment with pushing objects gently and hard. Record and explain what happens. Experiment with a slope and record how this changes the speed at which an object rolls.**	**Devise ways to slow down a toy car rolling down a slope. True or false? The surface on which a toy car rolls affects its speed?**
	Compare how different things move.	**Observe and describe the movement of a range of things including things that move with magnets.**	**Compare the movement of remote control cars and a helicopter drone. Explain the differences in movement.**	**Do heavy and light things move differently? Is there a pattern?**
PHYSICS To understand light and seeing	Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes.	**Name a variety of sources of light. Illustrate how light travels from light sources to our eyes.**	**Experiment with ways to block light from reaching our eyes. Point out how this demonstrates that light travels from a source to our eyes**	**True or false? The brighter the source of light the easier it is to see.**

Science Curriculum Progression
St Julian's Church School

PHYSICS To investigate sound and hearing	Observe and name a variety of sources of sound, noticing that we hear with our ears.	**Name a variety of sources of sound. Recognise a variety of sounds. Observe how we hear sounds with our ears. Illustrate that ears allow us to hear sounds.**	**Categorise sounds. Compare and contrast sounds based on your own criteria. (choose)**	**Suggest ways to protect our ears from loud sounds**
PHYSICS To understand electrical circuits	Identify common appliances that run on electricity.	**Observe and name some sources of electricity. (mains, battery) List common appliances that run on electricity.**	**Categorise electrical appliances. Explain the reasons for your categories. Compare and contrast some appliances in each of your categories.**	**Always, sometimes or never? Electrical appliances need batteries or mains electricity to power them.**
	Construct a simple series electrical circuit.	**Follow instructions to construct an electrical circuit. Describe the circuit, naming each component.**	**Modify a circuit to add more components. Experiment with and categorise the effect that adding more components has.**	**Diagnose and repair a broken circuit. (solve non routine problems)**
PHYSICS To understand the Earth's movement in space	Observe the apparent movement of the Sun during the day.	**Name times of the day. Observe and describe the sun's position in the sky at different times of the school day**	**Show how might you know (apply) roughly what time it is in a day by looking at the position of the sun.**	**Think of a way to prove that it is lunch time using the sun.**
	Observe changes across the four seasons.	**Name the four seasons. Notice and name the key features of each season.**	**Organise images or objects from each season into categories. Explain your categories.**	**Always sometimes or never? It is warm and dry during Summer**
	Observe and describe weather associated with the seasons and how day length varies.	**Observe and record weather over four seasons. Describe weather in a named season. Describe how daylight length varies in each season.**	**Compare and contrast weather and day length across the four seasons. Identify patterns in day length across the four seasons.**	**Plan some activities that would be suited to each season.**

LKS2

Learning Objective	Key Indicator	Basic	Advancing	Deep
BIOLOGY To understand plants	Identify and describe the functions of different parts of flowering plants: roots, stem, leaves and flowers.	**Describe and Illustrate the functions of different parts of flowering plants.**	**Explain how leaves are important in creating food for a plant.**	**Prove or disprove that roots act like straws sucking up water for the plant.**
	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.	**Grow, observe and record the growth of a range of different plants.**	**Compare and contrast the conditions for growth for a range of different plants. Explain why these differences may exist.**	**Create a planting plan for a 1 metre square bed of flowers that will look its best three years from planting. Justify your choice of plants.**

Science Curriculum Progression
St Julian's Church School

	Investigate the way in which water is transported within plants.	**Observe (or read about) and answer questions about how water is transported in plants.**	**Experiment with food colouring to demonstrate how water is transported through a plant. Explain the experiment and summarise your observations. Compare and contrast your observations with those of others.**	**Can you change the colour of celery? Prove it and draw some scientific conclusions.**
	Explore the role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	**Label the parts of a flower. Describe the process of pollination. List ways in which plants are pollinated. Describe how seeds are formed. List ways in which seeds are dispersed.**	**Using a range of (real) flowering plants, locate and name the parts of the flower. (apply) Compare different flowers and explain the differences in the size and shape of the parts of the flower. Explain why a flower that is not pollinated will not reproduce.**	**Suggest reasons why some people are worried about a fall in the number of bees in the British Isles. Why might flowering plants grow in high up rooftops or gutters even if humans did not put them there? Animals are a flowering plant's best friend. Do you agree? (reason)**
BIOLOGY To understand animals and humans	Identify that animals, including humans, need the right types and amounts of nutrition, that they cannot make their own food and they get nutrition from what they eat.	**Name the seven different types of nutrition that humans (and named animals) need. Describe a healthy fraction of the main nutrients for humans (and named animals). Illustrate how humans (and named animals) get nutrition from the food they eat. Name the (natural, i.e. not the shops!) sources of humans food**	**Compare and contrast how humans and flowering plants obtain their food. Summarise the main nutritional differences between carbohydrates, fibres, fats, proteins and water. Point out the effects of various vitamins and minerals on human health.**	**Investigate malnutrition. True or false? Some illnesses are caused by malnutrition. Suggest a range of foods for someone suffering from a vitamin C deficiency? Why might (suggest) children in countries affected by war become ill?**
	Construct and interpret a variety of food chains, identifying producers, predators and prey.	**Name producers, predators and prey in a food chain. Describe producers, predators and prey as herbivores, carnivores or omnivores. Describe energy flow in a food chain. Draw a food chain involving a mouse.**	**identify patterns in the flow of energy in a food chain. Demonstrate how food chains always begin with sunlight. Explain how water is essential in a food chain.**	**Suggest reasons why a growth in sparrowhawks might lead to a reduction in songbirds and too many insects, snails and slugs in gardens. How are predators affected by changes in the natural environment? (Generalise)**
	Identify that humans and some animals have skeletons and muscles for support, protection and movement.	**Label the main bones and joints in the human (and some animals) skeleton. Name the main muscles in the human (and some animals) body. Describe the role of the skeleton and muscles in support, protection and movement. Observe and describe the role of muscles in human movement.**	**Categorise muscle movement as relaxing or contracting. Explain the relationship between muscle groups as they relax and contract.**	**Recommend exercises that use each main muscle group in the human body**
	Describe the simple functions of the basic parts of the digestive system in humans.	**Label the parts of the human digestive system. Describe the functions of the human digestive system.**	**Relate the human digestive system to the way humans get nutrition. Contrast this with how plants get nutrition.**	**Suggest reasons why humans may suffer from digestion problems.**
	Identify the different types of teeth in humans and their simple functions.	**Label the types of adult human teeth. Describe the functions of the different types of teeth. Describe good care of teeth**	**Compare and contrast human teeth with those of a carnivore animal.**	**Cite evidence of how diet is linked to the health of human teeth.**

Science Curriculum Progression
St Julian's Church School

BIOLOGY To investigate living things	Recognise that living things can be grouped in a variety of ways.	**Name groups of animals (and plants). Describe the features of animals (and plants) in particular groups. Match animals (and plants) to groups.**	**Compare and contrast the features of animals (and plants) in different groups. Summarise the key similarities and differences of animals (and plants) in different groups. Explain why you have chosen the key similarities and differences to summarise.**	**Are there any ways in which you could classify animals (and plants) so that they may be in more than one group? (suggest, reason, propose, arrange)**
	Explore and use classification keys.	**Complete a classification key from a list of animals (and plants).**	**Identify animals (and plants) using a classification key (apply). Adapt a classification key to include different criteria.**	**Construct classification keys for animals (and plants).**
	Recognise that environments can change and that this can sometimes pose dangers to specific habitats.	**Name and describe a range of different habitats. Identify and label specific plants and animals in these habitats. Describe how (for example, deforestation in rainforests) is a danger to specific habitats.**	**Compare changes in two or more habitats and categorise the effects of the changes.**	**Explain the concept of conservation and how groups are trying to preserve habitats.**
BIOLOGY To understand evolution and inheritance	Identify how plants and animals, including humans, resemble their parents in many features.	**Match pictures of (human and animal) offspring to their parents. Notice and describe how they sometimes resemble each other. Notice that and describe how this may not be the case for all humans. Notice and label the resemblance between plants and those that grow from their seeds.**	**Categorise resemblances between humans (and plants and animals) and organise your findings.**	**Explain the concept of inheritance. Investigate how scientists and doctors are researching conditions that are inherited from a parent.**
	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.	**Name a variety of animal and plant fossils. Describe the conditions in which the fossils once lived. Note, name and describe plants and animals that inhabited the Earth millions of years ago.**	**Categorise fossils in a number of ways. Compare and contrast different fossils. Explain the process of the formation of fossils.**	**Investigate the conditions in which life on Earth survived millions of years ago. Burning fossil fuels is widely thought by scientists to contribute to a rise in worldwide temperature. Investigate this and cite evidence that supports or questions this view.**
	Identify how animals and plants are suited to and adapt to their environment in different ways.	**Match a range of animals and plants to the environments in which they are found. Describe how animals and plants are suited to the environments in which they are found. Illustrate how animals and plants adapt to environments in different ways.**	**Explain and give examples of the idea of adaptation. Compare and contrast different types of adaptation.**	**True or false: plants and animals would not survive if they could not adapt? Which do you think are the best examples (suggest) of an animal and plant that shows adaptation ?**
CHEMISTRY To investigate materials	Compare and group together different kinds of rocks on the basis of their simple, physical properties.	**Name different types of rock. Describe the properties (including hardness) of a variety of different rocks. Label some of the minerals found in rocks.**	**Compare and contrast the properties of different rocks. Group rocks on the basis of their properties. (rather than their origins) Infer the names and types of rocks based on their observable properties or descriptions of their minerals**	**True or false: The colour of a rock is a good clue that helps to identify it? Always, sometimes or never: Rocks that sparkle have a high quartz content?**

Science Curriculum Progression
St Julian's Church School

	Relate the simple physical properties of some rocks to their formation (igneous or sedimentary).	**Observe and describe the properties of igneous and sedimentary rocks. Describe rocks as igneous or sedimentary. Describe the properties of igneous and sedimentary rocks. Illustrate how igneous and sedimentary rocks are formed.**	**Explain the main differences between igneous and sedimentary rocks. Compare the origins of different types of rocks and identify patterns that would help one to infer the type of rock.**	**Generalise: how can the hardness of a rock be related to its origins?**
	Describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rock.	**Describe the formation of fossils. Illustrate the formation of fossils.**	**Identify the types of fossils (identify patterns) that are most likely to be found in different types of sedimentary rocks [e.g. in shale, limestone, sandstone etc.]**	**Is it possible that fossils could be found within igneous rocks? Cite evidence.**
	Recognise that soils are made from rocks and organic matter.	**Observe and describe the properties of soils. Observe and name different types of soils. Find out about and describe how soil is formed from rocks and organic matter. Name the 'parent' materials of different types of soils.**	**Explain how weathering contributes to the formation of soils. Compare and contrast different types of soils. Categorise soils using a range of different criteria. Test soils in various ways in order to identify them.**	**Recommend plants for different soil conditions. True or false: Alluvial soils are richer in nutrients than most other soils? Investigate the flooding of the river Nile in ancient Egyptian times and relate this to your knowledge of soils.**
	Compare and group materials together, according to whether they are solids, liquids or gases.	**Name materials as solids, liquids or gases. Observe and describe the typical properties of solids, liquids and gases. Complete tables to show information about solids, liquids and gases.**	**Compare and contrast solids, liquids and gases. Classify liquids in different ways. Classify solids in different ways. Classify gases in different ways. Explain why a helium filled balloon will float in air.**	**True or false: liquids take the form of the container they are in? True or false: solids keep their shape unless it is altered by a force? Always, sometimes or never: gases are lighter than solids?**
	Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics.	**Observe and describe the effect of heating and cooling water, chocolate, butter and other everyday materials. Measure the changing temperature of materials as they are heated and cooled and complete tables and graphs to show the effects.**	**Summarise, using scientific terminology the relationship between temperature and states of matter. Explain the three states of matter of water and how temperature affects its state.**	**Create a testable hypothesis about states of matter, carry out tests and prove or disprove your hypothesis.**
	Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	**Describe the water cycle. Observe evaporation. Observe and describe the different rates of evaporation in different temperatures.**	**Graph the relationship between temperature and evaporation. Summarise your results.**	**Suggest practical uses for the relationship between temperature and evaporation.**
PHYSICS To understand movement, forces and magnets	Compare how things move on different surfaces.	**Observe and describe the movement of objects on surfaces that are smooth and rough, flat and inclined to different degrees. Compete tables to record observations. Use the word friction appropriately.**	**Identify patterns in the type of surface and how this affects movement. Explain why these patterns may exist. Experiment with practical applications of this relationship.**	**Investigate the design of car tyres and connect this to your understanding of friction.**

Science Curriculum Progression
St Julian's Church School

	Notice that some forces need contact between two objects, but magnetic forces can act at a distance.	**Observe and illustrate how objects need a contact force for them to move. Name the contact forces that move objects. Observe and illustrate how magnetic forces act at a distance.**	**Experiment with magnets to explore whether the force of magnetism can act through materials (such as placing magnets in ice, etc.) Identify any patterns in the type and amount of material the force is acting through.**	**Investigate practical applications of magnetism in everyday life.**
	Observe how magnets attract or repel each other and attract some materials and not others.	**Observe and describe how magnets attract or repel each other. Observe and describe that magnets attract some (name) materials and not others.**	**Experiment with iron filings to see how they act when magnets attract and repel each other. Record your findings and explain what is happening.**	**Explain the concept of magnetic fields and how magnets attract or repel one another when placed near each other. Prove that there are magnetic fields by making them 'visible'**
	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.	**Observe then complete tables that describe everyday materials as 'attracted' or 'not attracted' to magnets.**	**Explain why some materials are attracted to magnets and others are not.**	**Investigate practical applications of the understanding of which materials are or are not attracted to magnets. Suggest some uses for this in school.**
	Describe magnets as having two poles.	**label the north and south poles of magnets.**	**Explain why magnets have poles. Experiment with cutting magnets in two. Observe and explain what happens.**	**Why (explain concept) do we call parts of Earth the North and South poles? Investigate the Aurora Borealis and explain (the concept) how this is linked to magnetism.**
	Predict whether two magnets will attract or repel each other, depending on which poles are facing.	**Observe and describe the effect of placing like and different poles of a magnet next to each other. Complete tables that show what you expect to happen when different combinations of poles are facing each other.**	**Apply your knowledge of magnetic poles to create a game that uses the idea that magnets attract or repel each other.**	**s it possible (suggest) to make a magnet? Prove or disprove this.**
PHYSICS To understand light and seeing	Recognise that light is required in order to see things and that dark is the absence of light.	**Observe and record the effect of light in seeing things. Answer questions about the effect of light on seeing. Describe darkness.**	**Explain the relationship between light and seeing. Experiment with different levels of light on the visibility of different coloured objects. Explain why it is important to dress in high visibility clothing in some situations**	**Relate your knowledge of the Earth's rotation in space to your understanding of light and dark. True or false: The Sun is the only natural source of light in our solar system?**
	Notice that light is reflected from surfaces.	**Observe light reflected from surfaces. Describe the effect of light reflecting from surfaces. Label a number of effects of reflection.**	**Experiment with light reflecting from a variety of different surfaces. Categorise surfaces in terms of their reflective properties.**	**Always, sometimes or never: Dark surfaces do not reflect light as well as those that are light?**
	Recognise that light from the sun can be dangerous and that there are ways to protect one's eyes.	**Name some safety rules to avoid damaging ones eyes with light from the sun.**	**Apply your knowledge of safety rules to explain how to safely view a solar eclipse.**	**Investigate different types of sunglasses and recommend the best type to protect ones eyes from day to day sunlight. (teacher: reinforcing the point that it is still**

Science Curriculum Progression
St Julian's Church School

				not safe to look at the sun even through sunglasses)
	Recognise that shadows are formed when the light from a light source is blocked by a solid object.	**Observe and record the effect of blocking light with solid objects. Name the effect and describe what is happening.**	**Explain why an umbrella is a useful practical example (apply) of shadows. Give examples of other practical uses (apply) for shadows.**	**True or false: night time is a shadow?**
	Find patterns in the way that the size of shadows change.	**Observe and record the length of shadows at different times of the day. Observe and record how the size of shadows change when the source of light is moved closer or further away from the object causing the shadow.**	**Explain why shadows change size. Predict when shadows will take a particular shape. e.g. what will the shadow of a tree look like on a bright summer evening with the sun in a particular position?**	**What is the relationship between the height of a light source in relation to the object that is causing a shadow?**
PHYSICS To investigate sound and hearing	Identify how sounds are made, associating some of them with something vibrating.	**Listen to and describe a range of sounds from different sources. Identify the source of sounds. Complete experiments and record findings that demonstrate how a tuning fork is vibrating when it makes a sound.**	**Compare and contrast how loud and quiet sounds are made. Experiment with stringed musical instruments to discover how high and low notes are made and explain your findings. Explain the role of vibration in creating sounds.**	**Suggest a way to prove the relationship between vibration and pitch. True or false: Higher notes are louder than lower notes?**
	Recognise that vibrations from sounds travel through a medium to the ear.	**Listen to and describe sounds through a variety of mediums. Draw a labelled diagram that shows how vibrations travel through a medium to the ear.**	**Compare and contrast the effectiveness of different mediums in transmitting sounds.**	**Suggest reasons why whales and dolphins can communicate over long distances. Do you agree: air is not a very good medium for transmitting sounds?**
PHYSICS To understand electrical circuits	Identify common appliances that run on electricity.	**Identify and name common appliances that run on electricity. Label appliances that run on high and low voltage electricity. Identify and describe sources of electricity for appliances, including mains, battery, solar and others.**	**Explain the similarities and differences between a 240 volt 40 watt halogen light bulb and a 12 volt, 6 watt L.E.D light bulb. Explain the similarities and differences between a 240 volt mains powered vacuum cleaner and a 12 volt battery vacuum cleaner.**	**Investigate battery powered road cars and draw some conclusions about their benefits and problems.**
	Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.	**Follow instructions to create a series circuit. Label the components of the circuit.**	**Make a number of series circuits containing different components. Explain the similarities between the circuits despite the different components.**	**Explain the concept of a series circuit and recommend some general rules.**
	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.	**Complete incomplete circuits by adding the correct components. Answer questions about the completeness of various circuits.**	**Predict the effect of changing the arrangement of the components of a circuit (some of which maintain a circuit and other that do not). Experiment with the effect of placing more than one bulb in a series circuit and summarise your findings.**	**Find and rectify faults (solve non-routine problems) for a range of incomplete circuits**

Science Curriculum Progression
St Julian's Church School

	Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.	**Observe and describe the effect of using switches in a circuit. Complete circuit diagrams showing and labelling switches.**	**Explain why opening and closing switches affects a series circuit.**	**True or false: If there are five switches in a row in a series circuit, only one needs to be 'on' for the circuit to be complete? Relate the idea of switches to the creation and sending of 'morse code'.**
	Recognise some common conductors and insulators, and associate metals with being good conductors.	**Observe and record how different materials act as conductors or insulators of electricity. Observe the effect of some poor and good conductors and label materials as poor or good conductors.**	**Categorise materials on the basis of their conductivity. Experiment with materials that conduct but also resist the flow of electricity. Summarise your findings.**	**True or false: Everything on Earth either conducts or doesn't conduct electricity, including humans?**
PHYSICS To understand the Earth's movement in space	Describe the movement of the Earth relative to the Sun in the solar system.	**Describe the movement of the Earth relative to the Sun. Label and describe our solar system. Answer questions about the scientists who first observed the Earth's movement around the Sun. Describe how the movement of the Earth gives rise to seasonal changes.**	**Explain why the Earth's movement gives rise to the seasons. Explain why the effect of the Earth's movement on seasons is more acute further away from the equator.**	**True or false: A year is always 365 days, no matter where one is in our solar system? Relate your knowledge of the Earth's movement relative to the Sun to time zones. Assess the significance of this to our daily lives. Do you agree: At any time of day it is always 5 O' Clock somewhere on Earth.**
	Describe the movement of the Moon relative to the Earth.	**identify and label the Moon and Earth. Describe the Moon's movement relative to the Earth. Answer questions about theMoon's movement relative to the earth. Observe, name and record the phases of the Moon.**	**Explain why the moon's movement affects the tides of oceans and seas on Earth. Explain how we can predict the times of high and low tides.**	**Could this be true: the shape of the moon's phases is a natural calendar? Is it possible (prove or disprove) to calculate how long until a particular moon shape will appear again? Explain the concept of a leap year.**

UKS2

Learning Objective	Key Indicator	Basic	Advancing	Deep
BIOLOGY To understand plants	Relate knowledge of plants to studies of evolution and inheritance.	**Describe how plants and animals may evolve through adaptation to their environment.**	**Compare and contrast the way different plants and animals have adapted to their environments. Organise information graphically.**	**What is the relationship between plants adapting to their environments and the theory of human evolution?**
	Relate knowledge of plants to studies of all living things.	**Describe the life processes common to all living things.**	**In which ways do the life processes of all living things vary? (contrast) Organise information, including data that supports that the life processes of all living things vary.**	**Why do the leaves of deciduous trees change colour and fall off in Autumn? (generalise) How does this relate to any life processes of animals?**
BIOLOGY To understand animals and humans	Describe the changes as humans develop to old age.	**Describe the main changes in the human body from a child to an adult to old age. What are (describe) the physical signs of humans ageing?**	**Compare and contrast the physical appearance of children and adults. Graph changes in average heights of males and females at different ages. Summarise your**	**Interpret data about normal blood pressure in children and adults and draw some conclusions. Make generalisations between the relationship between age and changes**

Science Curriculum Progression
St Julian's Church School

			findings.	**in humans. (emphasising continuous variables noted by the use of comparative degrees ending in er e.g. the younger the person the smaller their size)**
	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.	**Draw and label diagrams of the human circulatory system. Describe the functions of the heart, blood vessels and blood.**	**Contrast the different roles of veins and arteries in the human circulatory system. Explain the different functions of the parts of the human heart.**	**Discover information about human blood pressure. Relate information about blood pressure to diet and lifestyle.**
	Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions.	**Read and answer questions about the importance of diet and exercise. Observe and record the effect of exercise on heartbeat. Describe a healthy, balanced diet. Describe some of the possible effects of poor exercise, drug misuse (including smoking) and poor diet on the way the human body functions.**	**Graph the effect of exercise on pulse rate. Explain your findings. Explain the possible effects of too much sugar in one's diet on how the human body functions.**	**Discover how coronary arteries may become blocked and cause heart attacks. Argue this statement: You are what you eat. Do you agree: diet is eighty percent of your fitness regime and exercise twenty?**
	Describe the ways in which nutrients and water are transported within animals, including humans.	**Name some nutrients that are important for humans. Describe how nutrients are important for animals and humans. Draw diagrams that show how arteries and veins are connected by capillaries. Describe how water and nutrients pass from the arteries, through capillaries, to veins.**	**Explain the similarities and differences between arteries, veins and capillaries. Explain why, in humans, capillaries are vital for the transportation of water and nutrients. Explain why the transportation of water and nutrients in humans is important for: • joints • mucus membranes • blood • removing toxins**	**Relate the transportation of water in humans and animals to your knowledge of plants.**
BIOLOGY To investigate living things	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.	**Draw and Describe the life cycle of a mammal. Draw and Describe the life cycle of an amphibian. Draw and Describe the life cycle of an insect. Draw and Describe the life cycle of a bird.**	**Explain the similarities and differences in the life cycles of a mammal, an amphibian, an insect and a bird.**	**True or false: all young offspring look like smaller versions of their adult parents? Always, sometimes or never: eggs are common to the life cycles of mammals, amphibians, insects and birds?**
	Describe the life process of reproduction in some plants and animals.	**Draw and describe the process of reproduction in some plants. Draw and describe the process of reproduction in some animals.**	**Explain the similarities and differences between the process of reproduction in plants and animals.**	**Relate the reproduction of plants to your knowledge of the life cycle of insects. Relate the reproduction of some animals and plants to your knowledge of food chains.**
	Describe how living things are classified into broad groups according to common observable characteristics.	**Look at and copy classification keys for common insects. Use classification keys to identify insects and animals. Make classification keys.**	**Identify plants, mammals, amphibians, insects and birds from classification keys. Explain why observable features are used to classify living things into broad groups.**	**Propose criteria for the creation of classification groups for either: • mammals • amphibians • insects • birds. Present information about and reasons for these groups.**

Science Curriculum Progression
St Julian's Church School

	Give reasons for classifying plants and animals based on specific characteristics.	**Recognise and name the characteristics used in classification groups for plants and animals. List reasons why these characteristics are used.**	**Explain some of the problems with not using specific characteristics when classifying living things.**	**Do you agree: observable characteristics are not the only way to scientifically group plants and animals?**
BIOLOGY To understand 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. **Note - this indicator also appears in Milestone 2 and the tasks here are replicated*	**Name a variety of animal and plant fossils. Describe the conditions in which the fossils once lived. Note, name and describe plants and animals that inhabited the Earth millions of years ago.**	**Categorise fossils in a number of ways. Compare and contrast different fossils. Explain the process of the formation of fossils.**	**Investigate the conditions in which life on Earth survived millions of years ago. Burning fossil fuels is widely thought by scientists to contribute to a rise in worldwide temperature. Investigate this and cite evidence that supports or questions this view.**
	Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.	**Observe and describe differences between living things and their offspring. Observe and name offspring that are not identical to their parents and describe how they vary**	**Categorise differences in living things and their offspring. Explain, with examples, how offspring are not identical**	**Is it possible that a litter of cocker spaniel puppies from two parents of the same colour may vary in colour?**
	Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. **Note - a similar indicator also appears in Milestone 2 but excludes the last part - 'and that adaptation may lead to evolution' . The tasks here are replicated with some additional tasks about evolution.*	**Match a range of animals and plants to the environments in which they are found. Describe how animals and plants are suited to the environments in which they are found. Illustrate how animals and plants adapt to environments in different ways. Describe the theory of evolution.**	**Explain and give examples of the idea of adaptation. Compare and contrast different types of adaptation. Explain why adaptation may lead to evolution.**	**True or false: plants and animals would not survive if they could not adapt? Which do you think are the best examples (suggest) of an animal and plant that shows adaptation ? Do you agree: evolution is the only way a species can survive?**
CHEMISTRY To investigate materials	Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets.	**Observe and describe materials on the basis of their hardness, solubility, conductivity and their response to magnets. Carry out (follow instructions) comparative tests to group materials. Carry out (follow instructions) fair tests to group materials.**	**Adapt a comparative test to group materials. Predict the outcomes of your test. Modify a fair test to group materials. Predict the outcomes of your test.**	**Devise an experiment that proves or disproves a hypothesis you have created about the properties of materials.**
	Understand how some materials will dissolve in liquid to form a solution and describe how to	**Observe (through direct experience) and describe materials as soluble or insoluble. Observe and describe the effect of evaporation of a solution on a substance (solute) that has dissolved in a liquid**	**Apply your knowledge of solutions to explain how a substance has not disappeared when it forms a solution. Modify a fair test to demonstrate your knowledge.**	**Relate, citing evidence, your understanding of solutions to your understanding of the water cycle.**

Science Curriculum Progression
St Julian's Church School

	recover a substance from a solution.	**solvent).**		
	Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.	**Observe and describe how items may be separated through filtering, serving and evaporation.**	**Experiment with ways to separate pebbles and silt in a solution of salt. Explain your methods and summarise your results**	**Is there a way (propose) to recover water after recovering a substance from a solution after evaporation? Prove it.**
	Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.	**Observe and describe materials on the basis of their hardness and conductivity. Label materials using a range of scientific vocabulary, including insulators and conductors. Carry out (follow instructions) comparative tests to assess the suitability of everyday materials for a purpose. Carry out (follow instructions) fair tests to assess the suitability of everyday materials for a purpose.**	**Apply your understanding of the properties of materials to explain why a range of everyday items have been made from a particular material.**	**What might happen (propose) if a bird sits on a live, uninsulated power line? Explain the concepts you are using to give your answer.**
	Demonstrate that dissolving, mixing and changes of state are reversible changes.	**Observe and describe how mixing is reversible. Observe and describe how dissolving a substance into a solution is reversible. Observe and describe how changes of state are reversible.**	**Demonstrate reversible changes by Graphing the temperature of water as it changes state from a liquid to a solid and from a solid to a liquid and identify patterns between temperature and state. Summarise your findings.**	**Always, sometimes or never: changes to materials that are reversible require something else to change first before they can change? Cite evidence.**
	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, oxidation and the action of acid on bicarbonate of soda.	**Observe and describe how burning a material creates a new material and is not reversible. Observe and describe how oxidation of (e.g. steel) creates a new material and is not reversible. Observe and describe how adding an acid to (e.g. bicarbonate of soda) creates a new material and is not reversible.**	**Categorise and give examples of changes as reversible or not reversible. Experiment with making Plaster of Paris moulds. Observe, record and explain what happens to the material as water is added to the powder. Summarise your findings.**	**True or false: changes in temperature cause only reversible and not irreversible changes? Cite evidence.**
PHYSICS To understand movement, forces and magnets	Describe magnets as having two poles. ** Note - this indicator also appears in Milestone 2 and the tasks here are replicated*.	**label the north and south poles of magnets.**	**Explain why magnets have poles. Experiment with cutting magnets in two. Observe and explain what happens.**	**Why (explain concept) do we call parts of Earth the North and South poles? Investigate the Aurora Borealis and explain (the concept) how this is linked to magnetism.**
	Predict whether two magnets will attract or repel each other, depending on which poles are	**Observe and describe the effect of placing like and different poles of a magnet next to each other. Complete tables that show what you expect to happen when different**	**Apply your knowledge of magnetic poles to create a game that uses the idea that magnets attract or repel each other.**	**Is it possible (suggest) to make a magnet? Prove or disprove this.**

Science Curriculum Progression
St Julian's Church School

	facing. ** Note - this indicator also appears in Milestone 2 and the tasks here are replicated.*	**combinations of poles are facing each other.**		
	Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.	**Observe and describe the effect of the force of gravity.**	**Interpret data about the rate that different materials fall towards Earth. Summarise your findings.**	**Which will reach Earth first if dropped from the same height: 1kg of feathers or 1kg of steel? (explain concepts)**
	Identify the effect of drag forces, such as air resistance, water resistance and friction that act between moving surfaces.	**Observe and describe the effect of air resistance. Observe and describe the effect of water resistance. Observe and describe the effect of friction. Describe these forces as drag forces**	**Apply your knowledge of friction to positive applications. Explain your ideas.**	**Relate the size of a drag force to the size of the object it is acting on.**
	Describe, in terms of drag forces, why moving objects that are not driven tend to slow down.	**Observe and describe how objects tend to slow down because of drag forces.**	**Apply your knowledge of drag forces to some positive applications.**	**Always, sometimes or never: the slowing effect of drag forces can be overcome if an object is driven. (explain concept, make generalisations) (emphasising continuous variables noted by the use of comparative degrees ending in er)**
	Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs. Note: we recommend linking this indicator to mechanical systems in Design Technology.	**Observe and describe how forces and motion can be transferred through gears, pulleys, levers and springs. Label the forces and draw the directions in which they transfer.**	**Apply your knowledge of forces and movement to make a working mechanism.**	**Can (suggest) a rotary motion be changed into a linear (up and down) motion? Prove or disprove this.**
	Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect. Note: we recommend linking this indicator to mechanical systems in Design Technology	**Observe and describe the effect of changing gears on a bicycle. Observe and describe the effect of using a lever to try to move a heavy object (e.g. lifting the teacher) Observe and describe the effect of using a pulley, or geared pulleys to lift heavy objects**	**Apply your knowledge of gears, pulleys and levers to demonstrate and explain how a small force can have a greater effect.**	**Using a pulley allows a small force to have a greater effect but increases the amount of pulls one has to make. Make generalisations about the relationship between forces and effect. (emphasising continuous variables noted by the use of comparative degrees ending in er)**
PHYSICS To understand light and seeing	Understand that light appears to travel in straight lines.	**Draw and label diagrams to show how light travels.**	**Experiment with ways that demonstrate how light travels. Predict where light will appear after hitting a reflective surface.**	**Investigate whether light can ever 'bend' around corners and present information on this. Note :this is called diffraction. Does blocking light prove that it travels? (reason, investigate)**

Science Curriculum Progression
St Julian's Church School

	Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eyes.	**Draw and label diagrams that show how objects are seen. Observe and describe how light diverges from a source.**	**Experiment with making or using a periscope to demonstrate how objects may be seen. Explain what is happening to the light.**	**True or false: light is invisible?**
	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes.	**Draw and label diagrams that show how shadows are formed and that the size of the shadow may be predicted when the position of the source of light changes. Describe how divergent light from a source affects the size of shadows.**	**Explain why shadows are 'longer' in the winter and 'shorter' in the summer. Explain why a shadow of an object may not appear to be the same shape as the object.**	**Is it possible (reason) that a shadow can be formed that is smaller than the object that created it?**
	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.	**Draw and label diagrams to explain how we see.**	**Explain and demonstrate why we can not always see all of the Moon.**	**Investigate and present information on how objects, such as a stick, appear to bend when placed in water. Note: this is called refraction**
PHYSICS To investigate sound and hearing	Find patterns between the pitch of a sound and features of the object that produced it.	**Observe and describe the differences in the pitch of a sound and the object that produced it.**	**Experiment with, explain and demonstrate the pattern between pitch of sound and the features of the object that produced it. (emphasising continuous variables noted by the use of comparative degrees ending in er)**	**Relate your understanding of pitch to musical instruments.**
	Find patterns between the volume of a sound and the strength of the vibrations that produced it.	**Observe and describe differences in the volume of a sound and the strength of the vibrations that produced it.**	**Experiment with, explain and demonstrate the pattern between the volume of a sound and the strength of the vibrations that produced it. (emphasising continuous variables noted by the use of comparative degrees ending in er)**	**Relate your understanding of volume to a range of orchestral instruments. (How does, for example, a trombone player alter the strength of the vibrations he or she creates?)**
	Recognise that sounds get fainter as the distance from the sound source increases.	**Observe and describe differences in sounds that are close and far away from their sources.**	**Experiment with, explain and demonstrate the pattern between the volume of a sound and the distance from its source. (emphasising continuous variables noted by the use of comparative degrees ending in er)**	**Why might (suggest, reason) a thunderclap sound loud to some and feint to others?**
PHYSICS To understand electrical circuits	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.	**Observe and describe the effect of changing the number and voltage of cells used in a series circuit**	**Experiment with, explain and demonstrate the pattern between the voltage of cells and the brightness of a bulb. (emphasising continuous variables noted by the use of comparative degrees ending in er)**	**Suggest why a bulb or buzzer may stop working when the voltage is increased.**

Science Curriculum Progression
St Julian's Church School

	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.	**Observe and describe the effect of placing extra bulbs (or buzzers) into a circuit and how this can be overcome by increasing the number and voltage of cells.**	**Predict for the outcome of placing various components into an electrical circuit and explain why this happens. Explain the patterns. (emphasising continuous variables noted by the use of comparative degrees ending in er)**	**Investigate the concept of resistance and prove or disprove that components, including wire provide are resistors. Is it possible (suggest, prove) to make your own resistor?**
	Use recognised symbols when representing a simple circuit in a diagram.	**label and learn the recognised symbols for representing components in a circuit diagram.**	**Make circuits then represent them in circuit diagrams and applying component symbols appropriately.**	**How do the images of recognised symbols relate to their function?**
PHYSICS To understand the Earth's movement in space	Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. *Note: part of this indicator appears in Milestone 2 and the activities here have been replicated. Added are tasks that refer to other planets, which does not appear in Milestone 2.*	**Describe the movement of the Earth relative to the Sun. Label and describe our solar system. Answer questions about the scientists who first observed the Earth's movement around the Sun. Describe how the movement of the Earth gives rise to seasonal changes.**	**Explain why the Earth's movement gives rise to the seasons. Explain why the effect of the Earth's movement on seasons is more acute further away from the equator.**	**True or false: A year is always 365 days, no matter where one is in our solar system? Relate your knowledge of the Earth's movement relative to the Sun to time zones. Assess the significance of this to our daily lives. Do you agree: At any time of day it is always 5 O' Clock somewhere on Earth.**
	Describe the movement of the Moon relative to the Earth. *Note: this indicator appears in Milestone 2 and the activities here are replicated.*	**Identify and label the Moon and Earth. Describe the Moon's movement relative to the Earth. Answer questions about theMoon's movement relative to the earth. Observe, name and record the phases of the Moon.**	**Explain why the moon's movement affects the tides of oceans and seas on Earth. Explain how we can predict the times of high and low tides.**	**Could this be true: the shape of the moon's phases is a natural calendar? Is it possible (prove or disprove) to calculate how long until a particular moon shape will appear again? Explain the concept of a leap year.**
	Describe the Sun, Earth and Moon as approximately spherical bodies.	**Observe pictures and videos of the Sun, Earth and Moon and describe them using mathematical vocabulary.**	**Explain , using your knowledge of gravity, why the Sun, Earth and Moon are almost spherical.**	**Investigate reasons why planets and moons are not completely spherical. Explore terms such as 'equatorial bulge' and suggest an experiment that would prove this phenomenon.**
	Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	**Draw, label and describe how the Earth's rotation gives rise to day and night.**	**Explain and demonstrate how and why a sundial, used to tell the time, works.**	**At night, sun dials do not work. Suggest or investigate other ways one could tell the approximate time using views of the night sky.**