Key Areas of learning for Science (headings for areas of progression)
Biology B1: Living things are special collections of matter that make copies of themselves, use energy and grow. B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago. B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.
Chemistry C1: All matter (stuff) in the universe is made up of tiny building blocks. C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy) C3: Matter can change if the arrangement of these building blocks changes
Physics P1: The universe follows unbreakable rules that are all about forces, matter and energy. P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe. P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.
Earth science E1:The Earth is one of eight planets that orbit the sun. E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate. E3: The Earth is made up of several layers, including a relatively thin rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)

Science Curriculum Overview

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 3		Forces	Plants	Light	Rocks	Animals including humans
Year 4	States of matter	Sound	Animals including humans (Digestion & teeth)	Electricity	Animals & habitats	Animals & habitats continued
Year 5	Earth and space		Forces	Living things	Properties and changes	Animals including humans
Year 6	Electricity & Light		Living things & their habitats	Evolution & inheritance		Animals including humans (The heart & the circulatory system)

The following tables show our knowledge, skills and vocabulary progression across these key areas of science as children progress through our school as well as possible **linked scientists** that the children could study.

Bold text: This refers to sticky knowledge within each section in the progression document as well as key vocabulary (know...).
Italics = Skills (know how to...)

Working Scientifically Skills Progression (To be taught alongside other areas)					
Key Areas	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**
Questioning	• *Know how to ask simple scientific questions and consider different ways to find the answer.*	• *Know how to answer a whole class scientific question by carrying out simple scientific enquiry.*	• *Know how to answer a relevant scientific question through different types of scientific enquiries and using scientific evidence to support.*	• *Know how to refine a scientific question through the scientific process.* • *Know how to use scientific evidence to support or refute ideas or arguments to questions.*	• *Know how to achieve precision in scientific enquiry through refinement of the question and control of the variables.* • *Know how to use scientific evidence to support or refute ideas or arguments to questions.*
Observing and Measuring	• *Know how to choose the basic equipment needed to gather information and observations.*	• *Know how to carefully observe to gather results from scientific enquiry.* • *Know how to collect data from observations and measurements.*	• *Know how to accurately use equipment to gather data.* • *Know how to collect data systematically.* • *Know how to take accurate measurements using equipment such as thermometers.* • **Know that data can change if equipment is not used correctly.**	• *Know how to use more specialised equipment to observe and measure more accurately (e.g ICT, electronic devices).* • *Know when to repeat an observation or measurement to provide more accurate information.* • **Know that repeating an observation or measurement may provide more accurate information.**	• *Know how to be accurate and precise when observing and measuring to ensure precision with a scientific enquiry.* • *Know how to use standard measures including fractions, decimals and mixed units.* • *Know how to read scales with precision and accuracy.* • **Know that the level of accuracy and precision will determine the success of scientific enquiry.**
Testing	• *Know how to use simple equipment to perform a test.*	• *Know how to carry out a scientific enquiry using a fair process.*	• *Know how to prevent unreliable information being gathered through fair procedures.*	• *Know how to shape further scientific enquires through fair test outcomes such as controlling variables where necessary.*	• *Know how to use the outcomes from fair tests to support factual scientific knowledge.* • **Know that outcomes from fair tests may differ from opinion.**
Identifying (& Classifying)	• *Know how to sort or group by features/characteristics to give more accurate and detailed identification (e.g tree/oak, tree/deciduous).*	• *Know how to collect information during a simple scientific enquiry to inform identification and classification.* • *Know how to identify differences, similarities and changes related to simple scientific ideas and processes.*	• *Know how to answer questions in a simple scientific enquiry using accurate identification and classification.* • *Know how to identify differences, similarities and changes related to simple scientific ideas and processes.*	• *Know how to use a substantial amount of identification and classification information organised on an agreed method such as: keys, charts or graphs.*	• *Know how to select the most effective method of classifying information to provide success in a more complex scientific enquiry.*
Hypothesising	• *Know how to make a simple prediction based on prior knowledge and experience.*	• *Know how to use a hypothesis as a starting point for further scientific enquiry.*	• *Know how to refine a hypothesis because of scientific enquiry and use it to inform the next stage.*	• *Know how to inform a more accurate hypothesis using knowledge gained from previous scientific enquiries at the outset of a new enquiry.*	• *Know how to base efficient and effective scientific enquiry on an informed hypothesis.*

Interpreting and Recording Data	• *Know how to use recorded data to find answers.*	• *Know how to use recorded data to draw conclusions.* • *Know how to record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.* • *Know how to report on findings from enquires, including oral and written explanations, displays or presentations of results and conclusions.*	• *Know how to spot inaccurately recorded data before it leads to incorrect conclusions.* • *Know how to record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables with increasing accuracy.* • *Know how to accurately report on findings from enquires, including oral and written explanations, displays or presentations of results and conclusions.*	• *Know how to filter data to draw conclusions using only the most relevant information.* • *Know how to record data and results of increasing complexity using scientific diagrams and labels, tables, bar and line graphs* • *Know how to report and present findings from enquires, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations.*	• *Know how to use accurate data as a powerful tool for supporting or contesting scientific ideas/arguments.* • *Know how to record data and results of increasing complexity using scientific diagrams and labels, tables, bar and line graphs with increasing accuracy.* • *Know how to accurately report and present findings from enquires, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations.*

Biology					
	Year 2	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Animals Including Humans	• Know that animals, including humans, have offspring which grow into adults; • Know the basic needs of animals, including humans, for survival (water, food and air); • Know the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	• Know that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat; • **Know how the human body receives food.** • Know that humans and some other animals have skeletons and muscles for support, protection and movement. • **Know that there are many different parts in the human body.**	• Know the simple functions of the basic parts of the digestive system in humans; • Know the different types of teeth in humans and their simple functions; • **Know that food is digested and how.** • **Know that teeth have many functions.** • *Know how to construct and interpret a variety of food chains, identifying producers, predators and prey.* • Know that different substances will influence tooth health. • *Know how to keep teeth healthy.*	• Know the changes as humans develop to old age. **Know that puberty causes changes in the human body**	• **Know the different parts of the human body.** • Know the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood; • **Know that organs in the human body have different functions.** • **Know that diet, exercise, drugs and lifestyle an impact the way our body functions** • Know the ways in which nutrients and water are transported within animals, including humans.

			• Know what a food chain is and how they work.		
Vocabulary progression	• Being born and growing: **Young, offspring, live young**, grow, **develop**, change, hatch, lay, fly, crawl, talk. • Young and adult names: e.g. lamb and sheep, kitten and cat, duckling and duck. • **Life cycle** stages: e.g. baby, toddler, child, teenager, **adult;** frogspawn, tadpole, froglet, frog. • Survival and staying healthy: basic needs, survive, food, air, **exercise, diet, nutrition**, healthy, balanced diet, **hygiene, germs.** • Food groups: fruit and vegetables, proteins, dairy and alternatives, carbohydrates, oil and spreads, fat, salt, sugar.	• Food groups and **nutrients**: fibre, fats **(saturated and unsaturated**), vitamins, minerals. • Skeletons and muscles: skeleton, **muscles, tendons, joints,** protection, support, organs, voluntary muscles, involuntary muscles, biceps, triceps, contract, relax, bone, cartilage, shell, **vertebrate, invertebrate,** endoskeleton, exoskeleton, hydrostatic skeleton. • Names of human bones: e.g. skull, spine, backbone, vertebral column, ribcage, pelvis, clavicle, scapula, humerus, ulna, pelvis, radius, femur, tibia, fibula. • Other: **energy**.	• Digestive system: **digest**, digestion, tongue, teeth, saliva, salivary glands, **oesophagus, stomach,** liver, pancreas, gall bladder, **small intestine,** duodenum**, large intestine, rectum,** anus, faeces, organ. • Types of teeth and dental care: **molar**, **premolar**, **incisor**, **canine**, wisdom teeth, tooth decay, plaque, enamel, baby (milk) teeth. • Food chains and animal diets: decomposer, food web.	• Process of reproduction: **gestation, asexual reproduction, sexual reproduction,** sperm, egg, cells, clone. • Changes and **life cycle:** embryo, foetus, uterus, **prenatal, adolescence, puberty, menstruation, adulthood,** menopause, **life expectancy,** old age, hormones, sweat. • Changing body parts: e.g. breasts, penis, larynx, ovaries, genitalia, pubic hair.	• **Circulatory system**: circulation, **heart**, pulse, heartbeat, heart rate, lungs, breathing, **blood vessels**, blood, pump, transported, **oxygenated blood, deoxygenated blood,** oxygen, arteries, veins, capillaries, chambers, plasma, platelets, white blood cells, red blood cells. • Lifestyle: **drug, alcohol,** smoking, disease, calorie, energy input, energy output. • Other: water transportation, nutrient transportation, waste products.
Linked scientists		Marie Curie	Washington Sheffield-Toothpaste		Daniel Hale Williams Alexander Flemming Marie Maynard Daly

Biology

	Year 2	Year 3	Year 4	Year 5	Year 6
Living things and their habitats/ Plants/ Evolution and Inheritance	• Know that seeds and bulbs grow into mature plants; • Know that plants need water, light and a suitable temperature to grow and stay healthy.	• Know the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers; • Know 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; • Know the way in which water is transported within plants; • Know the different parts that flowers play in the life cycle of flowering plants, including	• Know that living things can be grouped in a variety of ways; • **Know that different living things are classified** • **Know that animals are grouped on their characteristics and based upon their behaviours** • **know that environments can change and that this can sometimes pose dangers to living things.** • **Know that human activity can affect the climate and the environment**	• **Know that there are different life cycles of a mammal, an amphibian, an insect and a bird;** • Know the life process of reproduction in some plants and animals. • **Know that there are differences and similarities between different life cycles**	• Know that living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals; • **Know that classifications of living things can be subdivided based on specific characteristics.** **Evolution and Inheritance** • Know that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago;

		pollination, seed formation and seed dispersal. • **Know that there are life cycles for plants and flowers** • Know how plants get food	• *Know how to use classification keys to help group, identify and name a variety of living things in their local and wider environment;*		• Know that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents; • Know how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. • **Know that evolution is a process resulting in changes over time to living things**
Vocabulary progression	• Growth of plants: **germination**, **shoot, seed dispersal,** grow, food store, life cycle, die, wilt, seedling • Needs of plants: **sunlight, nutrition,** light, healthy, space, air. • Name different types of plant: e.g. bean plant, cactus. • Names of different habitats: e.g. rainforest, desert.	• Water transportation: transport, **evaporation, evaporate, nutrients,** absorb, anchor. • Life cycle of flowering plants: **pollination** (insect/wind), pollen, nectar, pollinator, seed formation, **seed dispersal** (animal/wind/water), reproduce, **fertilisation,** fertilise, **stamen,** anther, filament, **carpel (pistil),** stigma, style, ovary, ovule, **sepal**, carbon dioxide.	• Living things: **organisms, specimen,** species. • Grouping living things: **classification,** classification keys, classify, **characteristics**. • Names of invertebrate animals: snails and slugs, worms, spiders, insects. • Invertebrate body parts: e.g. wing case, abdomen, thorax, antenna, segments, mandible, proboscis, prolegs. • Environmental changes: **environment,** environmental dangers, adapt, natural changes, climate change, deforestation, pollution, urbanisation, invasive species, **endangered species, extinct.**	• **Reproduction**: **asexual reproduction, sexual reproduction**, **gestation, metamorphosis,** gametes, tuber, runners/side branches, plantlet, cuttings, embryo, adolescent, penis, vagina, egg, pregnancy, gestation.	• Classifying: Carl Linnaeus, Linnaean system, flowering and non-flowering plants, variation. • **Microorganisms**: **bacteria,** single-celled, microbes, microscopic, virus, fungi, fungus, mould, antibiotic, yeast, ferment, **microscope**, decompose. • **Evolution** and **inheritance:** evolve, **adaptation,** inherit, **natural selection, adaptive traits, inherited traits,** mutations, theory of evolution, ancestors, biological parent, chromosomes, genes, Charles Darwin. • Other: selective breeding, artificial selection, breed, cross breeding, genetically modified food, cloning, DNA.
Linked scientist		Sir Joseph Banks George Washington Carver	Gerald Durrell	Eva Crane David Attenborough	Libbie Hyman Darwin

Chemistry					
	Year 2	**Year 3**	**Yr 4**	**Yr 5**	**Yr 6**
Rocks, soils and fossils	**Use of Everyday Materials** • Know that the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. • *Know how to compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses;*	**Rocks** • Know that fossils are formed when things that have lived are trapped within rock; • **Know that fossils are formed over many years** • Know that soils are made from rocks and organic matter • **Know that there are many different types of rock** • *Know how to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties;* Linked scientist: William Smith, Dr Lisa White, Inge Leh Mann			

Vocabulary progression	• Changing shape: squash, bend, twist, stretch. • **Properties** of **materials:** e.g. strong, flexible, light, hard-wearing, elastic. • Other: **suitability**, recycle, pollution.		Types of rock: **sedimentary rock, igneous rock, metamorphic rock. Properties of rocks: permeable,** semi-permeable, **impermeable,** durable. Names of rocks: e.g. marble, chalk, granite, sandstone, slate. Formation of rocks and fossils: natural, human-made, **magma, lava,** molten rock, **sediment, erosion, fossilisation,** layers, bone, fossil. Soil: sandy, chalky, clay, peaty, loamy, topsoil, subsoil, bedrock, mineral, organic matter, compost.			
	Yr 2	**Yr 3**	**Year 4**	**Year 5**		**Yr 6**
States of matter / Properties and changes of materials			**States of Matter** • Know that materials can be grouped together, according to whether they are solids, liquids or gases; • **Know that there are different states of matter** • Know 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); • **Know that temperature can affect states of matter** • Know the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **Linked Scientist:** **Lord Kelvin- Absolute Zero**	**Properties and Changes of Materials** • Know that everyday materials can be grouped together 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; • **Know that there are different methods to separate out materials.** • *Know how to use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating;* • *Know how to give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic;* • Know that dissolving, mixing and changes of state are reversible changes; • **Know that there are reversible and irreversible changes.** • Know that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. • **Know what a solution is.**		
Vocabulary progression			• **States of matter: solids, liquids, gases,** particles. • State change: **evaporate, condense, melt, freeze**, heat, cool, melting point, freezing point, boiling point, **water vapour**. • Water cycle: **precipitation**, evaporation, condensation, ground run-off, collection, underground water, bodies of water (sea, river, stream), water droplets, hail. • Other: atmosphere.	• Properties of **materials**: thermal **conductor/insulator,** magnetism, electrical resistance, **transparency**. • Mixtures and solutions: dissolving, substance, soluble, insoluble. • Changes of materials: reversible change, physical change, irreversible change, chemical change, burning, new material, product. • Separating: sieving, filtering, magnetic attraction. **Linked Scientist:** **Stephanie Kwolek**		

Physics					
	Yr 2	**Year 3**	**Year 4**	**Year 5**	**Year 6**

Forces		**Forces and Magnets** • Know that things move on different surfaces; • Know that some forces need contact between 2 objects, but magnetic forces can act at a distance; • **Know that there are different forces** • Know that magnets attract or repel each other and attract some materials and not others; • Know that a variety of everyday materials can be compared and grouped together on the basis of whether they are attracted to a magnet, and identify some magnetic materials; • Know that magnets have 2 poles; • *Know how to predict whether 2 magnets will attract or repel each other, depending on which poles are facing.* **Linked Scientist:** **Galileo Galilei**		**Forces** • Know that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object; • **Know what gravity is and what is does** • Know the effects of air resistance, water resistance and friction, that act between moving surfaces; • Know that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect. • **Know how a force is measured** • **Know that there are simple machines that are used to alter force** **Linked Scientist:** **Neil DeGrasse Tyson, Margaret Hamilton**	
Vocabulary progression		• How things move: move, movement, **surface**, distance, strength. • Types of **forces**: push, pull, contact force, non-contact force, **friction**. • **Magnets: magnetic, magnetic field,** magnetic force, bar magnet, horseshoe magnet, ring magnet, magnetic **poles** (north pole, south pole), **attract, repel,** compass. • Magnetic and non-magnetic materials: e.g. iron, nickel, cobalt. Previously introduced vocabulary: metal, names of materials.		• Types of forces: **air resistance, water resistance, buoyancy, upthrust,** Earth's **gravitational pull, gravity**, opposing forces, driving force. • **Mechanisms:** levers, pulleys, gears/cogs. • Measurements: **weight, mass,** kilograms (kg), Newtons (N), scales, speed, fast, slow. • Other: **streamlined**, Earth. Previously introduced vocabulary: air, heat, moon.	

Physics					
	Yr 2	**Year 3**	**Yr 4**	**Yr 5**	**Year 6**

Light		• Know that they need light in order to see things and that dark is the absence of light; • **Know that there are various sources of light** • Know that light is reflected from surfaces; • **Know that light travels** • Know that light from the sun can be dangerous and that there are ways to protect their eyes; • Know that shadows are formed when the light from a light source is blocked by an opaque object; • **Know that there are many barriers to light** • *Know how to find patterns in the way that the size of shadows change*. **Linked Scientist:** **Edison**			• **Know that light travels in straight lines** • **Know that light can change direction** • Know that objects are seen because they give out or reflect light into the eye; • Know that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes; • Know that shadows have the same shape as the objects that cast them because light travels in straight lines. • **Know that light has different colours** **Linked Scientist:** **Steve Jobs** **Revisit Edison**
Vocabulary progression		• **Light** and seeing: **dark,** absence of light, **light source,** illuminate, visible, **shadow, translucent,** energy, block. • **Light sources:** e.g. candle, torch, fire, lantern, lightning. • **Reflective light: reflect, reflection,** surface, **ray**, scatter, reverse, beam, angle, mirror, moon. Sun safety: dangerous, glare, damage, UV light, UV rating, sunglasses, direct.			• Reflection: periscope. • Seeing light: **visible spectrum, prism.** • How light travels: light waves, wavelength, straight line, **refraction.**

	Yr 2	Year 3	Year 4	Year 5	Year 6
Sound			• Know how sounds are made, associating some of them with something vibrating; • Know that vibrations from sounds travel through a medium to the ear; • Know that sounds get fainter as the distance from the sound source increases. • **Know that there are many different sounds** • **Know that sound travels in a variety of ways** • **Know that sounds can change** • *Know how to find patterns between the pitch of a sound and features of the object that produced it;* • *Know how to find patterns between the volume of a sound and the strength of the vibrations that produced it;* **Linked Scientist:** **Alexander Bell**		
Vocabulary progression			• Parts of the **ear**: **eardrum.** • Making sound: **vibration,** vocal cords, **particles.** • Measuring sound: **pitch**, **volume, amplitude, sound wave,** quiet, loud, high, low, travel**, distance.** • Other: **soundproof, absorb sound.**		

Physics

	Yr 2	Year 3	Year 4	Year 5	Year 6

Earth and Space				• **Know that there are planets in the solar system** • **Know what to orbit means and that orbits can be measured** • **Know what an axis is and what it does** • Know that the Earth and other planets relative to the Sun in the solar system, orbit the Sun; • Know that the Moon orbits the Earth; • Know that the Sun, Earth and Moon are approximately spherical bodies; • Know that the Earth's rotation can explain day and night and the apparent movement of the sun across the sky. **Linked Scientist:** **Elon Musk** **Helen Sharman** **Liu Yang, Chinese Astronaut**	
Vocabulary progression				• Solar system: **star, planet.** • Names of planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Neptune, Uranus. • Shape: **spherical bodies, sphere.** • Movement: **rotate, axis, orbit, satellite.** • Theories: **geocentric model, heliocentric model, astronomer.** • Day length: sunrise, sunset, midday, time zone.	

	Yr 2	Yr 3	Year 4	Yr 5	Year 6
Electricity			• Know some common appliances that run on electricity; • **Know that there are many uses for electricity** • Know the basic parts of a simple electrical circuit, including cells, wires, bulbs, switches and buzzers; • *Know how to construct a simple series electrical circuit,* • Know 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; • Know that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit; • Know some common conductors and insulators, and associate metals with being good conductors. • **Know that electricity flows and what can stop electricity from flowing** **Linked Scientist: Maria Telkes, Thomas Edison & Lewis Latimer**		• Know that the brightness of a lamp or the volume of a buzzer depends upon the number and voltage of cells used in the circuit; • **Know that electricity has different recognised symbols** • **Know that electricity can be measured** • **Know that electricity has dangers** • *Know how to 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;* • *Know how to use recognised symbols when representing a simple circuit in a diagram.* **Linked Scientist:** **Edison**
Vocabulary progression			• **Electricity:** mains-powered, battery-powered, **mains electricity,** plug, **appliances**, devices. • Circuits: **circuit,** simple series circuit, complete circuit, incomplete circuit. • Circuit parts: bulb, cell, wire, buzzer, switch, motor, **battery.** • Materials: **electrical conductor, electrical insulator.** • Other: safety.		• Flow and measure of electricity: **voltage, amps, resistance, electrons**, volts (V), **current.** • Circuits**: symbol,** circuit diagram, component, function, filament. • Variations: dimmer, brighter, louder, quieter. • Types of electricity: natural electricity, human-made electricity, solar panels, power station. • Other: positive, negative.