Science progression of skills

	Year 3	Year 4	Year 5	Year 6	KS3
Animals including Humans	Identify that animals, including humans, need the right types and amounts 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,	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,	Describe the changes as humans develop to old age.	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	the structure and functions of the human skeleton, to include support, protection, movement and making blood cells biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles the function of muscles and examples of antagonistic muscles the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed calculations of energy requirements in a healthy daily diet the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts) the importance of bacteria in the human digestive system

	protection and movement.	predators and prey.		water are transported within animals, including humans	reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta the effects of recreational drugs (including substance misuse) on behaviour, health and life processes comparing energy values of different foods (from labels) (kJ)
Earth and Space			Describe the movement of the Earth, and other planets, relative to the Sun in the solar system Describe the movement of the Moon relative to the Earth Describe the Sun, Earth and		the composition of the Earth the structure of the Earth gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and sun (qualitative only) our sun as a star, other stars in our galaxy, other galaxies the seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance

			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		
Electricity		Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.		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	comparing power ratings of appliances in watts (W, kW) comparing amounts of energy transferred (J, kJ, kW hour) domestic fuel bills, fuel use and costs fuels and energy resources electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current differences in resistance between conducting and insulating components (quantitative)

		Identify whether or not a bulb will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Recognise some common conductors and insulators, and associate metals with being good conductors. Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit		loudness of buzzers and the on/off position of switches. Use recognised symbols when representing a simple circuit in a diagram	the idea of electric field, forces acting across the space between objects not in contact

Evolution and Inheritance				Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may	heredity as the process by which genetic information is transmitted from one generation to the next a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model differences between species the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation the variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection changes in the environment which may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material

				lead to evolution	
Forces	Compare how things move on different surfaces. Notice that some forces need contact between two objects, but magnetic forces can act at a distance Observe how magnets attract or repel each other and attract some materials and not others Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet,		Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object Identify the effects of air resistance, water resistance and friction, that act between moving surfaces Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect		simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged forces as pushes or pulls, arising from the interaction between 2 objects using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces moment as the turning effect of a force forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water forces measured in newtons, measurements of stretch or compression as force is changed force-extension linear relation; Hooke's Law as a special case work done and energy changes on deformation non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and

	and identify some magnetic materials Describe magnets as having two poles Predict whether two magnets will attract or repel each other, depending on which poles are facing				stars; gravity forces between Earth and Moon, and between Earth and sun (qualitative only) atmospheric pressure, decreases with increase of height as weight of air above decreases with height pressure in liquids, increasing with depth; upthrust effects, floating and sinking pressure measured by ratio of force over area – acting normal to any surface opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) change depending on direction of force and its size magnetic poles, attraction and repulsion magnetic fields by plotting with compass, representation by field lines Earth's magnetism, compass and navigation the magnetic effect of a current, electromagnets, DC motors (principles only) the difference between chemical and physical changes

Light	Recognise that he/she needs 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 eyes Recognise that shadows are formed when the light from a light source is blocked by a solid object Find patterns in the way that the size of			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	the similarities and differences between light waves and waves in matter light waves travelling through a vacuum; speed of light the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection

	shadows change			as the objects that cast them	
Living things and their habitats		Recognise that living things can be grouped in a variety of ways Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment Recognise that environments can change and that this can sometimes pose dangers and have an impact on living things	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	the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops the importance of plant reproduction through insect pollination in human food security how organisms affect, and are affected by, their environment, including the accumulation of toxic materials
Materials			Compare and group together everyday materials on		the concept of a pure substance mixtures, including dissolving

			the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets Recognise that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering,		diffusion in terms of the particle model simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography the identification of pure substances

			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		
Plants	Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers Explore and describe 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.				plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots the role of leaf stomata in gas exchange in plants reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms the reactants in, and products of, photosynthesis, and a word summary for photosynthesis the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere the adaptations of leaves for photosynthesis

	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				
Rocks and Soils	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties Describe in simple terms how fossils are formed when things that have lived are				the rock cycle and the formation of igneous, sedimentary and metamorphic rocks

	trapped within rock Recognise that soils are made from rocks and organic matter				
Sound		Identify how sounds are made, associating some of them with something vibrating Recognise that vibrations from sounds travel through a medium to the ear Find patterns between the pitch of a sound and features of the object that produced it Find patterns between the volume of a			frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound sound needs a medium to travel, the speed of sound in air, in water, in solids sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal the auditory range of humans and animals

		sound and the strength of the vibrations that produced it Recognise that sounds get fainter as the distance from the sound source increases			
States of Matter		Compare and group materials together, according to whether they are solids, liquids or gases Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in			the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure changes of state in terms of the particle model conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving similarities and differences, including density differences, between solids, liquids and gases Brownian motion in gases the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition atoms and molecules as particles

		degrees Celsius (°C) Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature			changes with temperature in motion and spacing of particles internal energy stored in material
Working Scientifically	Ask relevant questions and use different types of scientific enquiries to answer them. (Y3 focus) Set up simple practical enquiries, comparative and fair tests (Y3 focus) Make systematic and	Ask relevant questions and use different types of scientific enquiries to answer them. (Y4 focus) Set up simple practical enquiries, comparative and fair tests (Y4 focus) Make systematic and	Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary (Y5 focus) Take measurements, using a range	Plan different types of scientific enquiries to answer their own or others questions, including recognising and controlling variables where necessary (Y6 focus) Take measurements,	Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review Evaluate risks Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience Make predictions using scientific knowledge and understanding

	careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers (Y3 focus) Gather, record, classify and present data in a variety of ways to help in answering questions (Y3 focus) Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and	careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers (Y4 focus) Gather, record, classify and present data in a variety of ways to help in answering questions (Y4 focus) Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and	of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate (Y5 focus) Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs (Y5 focus) Use test results to make predictions to set up further comparative and fair tests (Y5 focus)	using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate (Y6 focus) Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs (Y6 focus) Use test results to make predictions to set up further comparative and fair tests (Y6 focus)	Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements Apply sampling techniques Apply mathematical concepts and calculate results Present observations and data using appropriate methods, including tables and graphs Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions Present reasoned explanations, including explaining data in relation to predictions and hypotheses Evaluate data, showing awareness of potential sources of random and systematic error Identify further questions arising from their results

	tables (Y3 focus) Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions (Y3 focus) Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions (Y3 focus) Identify differences, similarities or changes related to	tables (Y4 focus) Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions (Y4 focus) Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions (Y4 focus) Identify differences, similarities or changes related to	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 (Y5 focus) Identify scientific evidence that has been used to support or refute ideas or arguments (Y5 focus)	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 (Y6 focus) Identify scientific evidence that has been used to support or refute ideas or arguments (Y6 focus) Describe and evaluate their own and other people's scientific ideas related to topics	Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature Use and derive simple equations and carry out appropriate calculations Undertake basic data analysis including simple statistical techniques

	simple scientific ideas and processes (Y3 focus) Use straightforward scientific evidence to answer questions or to support his/her findings (Y3 focus)	simple scientific ideas and processes (Y4 focus) Use straightforward scientific evidence to answer questions or to support his/her findings (Y4 focus)		in NC (including ideas that have changed over time), using evidence from a range of sources. Group and classify things and recognise patterns Find things out using a wide range of secondary sources of information. Use appropriate scientific language and ideas from NC to explain, evaluate and communicate his/her methods and findings.	