

Concept	KS1	Y3	Y4	Y5	Y6	KS3
Biology						
Plants	<p>Understand that plants are a living organism.</p> <p>Identify and name a variety of common plants including deciduous and evergreen trees.</p> <p>Identify and describe the basic structure of flowering plants and trees.</p> <p>Observe and describe how seeds and bulbs grow.</p> <p>Understand and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p>	<p>Understand that plants are a living organism.</p> <p>Identify and describe the functions of different parts of flowering plants including: roots, stem, trunk, leaves and flowers.</p> <p>Understand the requirements of plants for life and growth (air, light, water, nutrients and room to grow).</p> <p>Understand and investigate the way in which water is transported within plants.</p> <p>Explore the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p>				<p>Cells and organisation:</p> <p>Cells as the fundamental unit of living organisms.</p> <p>The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts.</p> <p>The similarities and differences between plant and animal cells.</p> <p>Nutrition and digestion:</p> <p>Plants make carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots.</p> <p>Gas Exchange Systems:</p> <p>The role of leaf stomata in gas exchange in plants.</p> <p>Reproduction:</p> <p>Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal.</p> <p>Photosynthesis:</p> <p>The process of photosynthesis.</p> <p>The dependence of almost all life on Earth on the ability of photosynthetic organisms to maintain levels of oxygen and carbon dioxide in the atmosphere.</p> <p>The adaptations of leaves for photosynthesis.</p>
Animals Including Humans	<p>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.</p> <p>Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</p> <p>Describe and compare the structure</p>	<p>Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food (they get nutrition from what they eat).</p> <p>Identify that humans and some other animals have skeletons and</p>	<p>Describe the simple functions of the basic parts of the digestive system in humans.</p> <p>Identify the different types of teeth in humans and their functions.</p>	<p>Describe the changes as humans develop to old age.</p>	<p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way bodies function.</p>	<p>Cells and organisation:</p> <p>Cells as the fundamental unit of living organisms.</p> <p>The functions of the cell wall, cell membrane, cytoplasm, nucleus,</p>

	<p>of a variety of common animals (fish, amphibians, reptiles, birds and mammals).</p> <p>Identify, name, draw and label the basic parts of the human body.</p> <p>Notice that animals, including humans, have offspring which grow into adults.</p> <p>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).</p> <p>Describe the importance of exercise for humans, eating the right amounts of different types of food, and hygiene.</p>	<p>muscles for support, protection and movement.</p>	<p>Construct and interpret a variety of food chains, identifying producers, predators and prey.</p>		<p>Describe the ways in which nutrients and water are transported within animals, including humans.</p>	<p>vacuole, mitochondria and chloroplasts.</p> <p>The similarities and differences between plant and animal cells.</p> <p>The role of diffusion.</p> <p>The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.</p> <p>The skeletal and muscular systems:</p> <p>The structure and functions of the human skeleton.</p> <p>Biomechanics – the interaction between skeleton and muscles.</p> <p>Nutrition and digestion:</p> <p>The content of a healthy human diet.</p> <p>The consequences of imbalances in the diet.</p> <p>The tissues and organs of the human digestive system (enzymes as biological catalysts).</p> <p>The importance of bacteria in the human digestive system.</p> <p>Gas Exchange Systems:</p> <p>Understand gas exchange systems including the impact of exercise, asthma and smoking on humans.</p> <p>Reproduction:</p> <p>Reproduction in humans, including the structure and function of the male and female reproductive systems.</p> <p>Health:</p> <p>The effects of recreational drugs (including substance misuse) on behaviour, health and life processes.</p>
<p>Living Things and their Habitats</p>	<p>Explore and compare the differences between things that are living, dead, and things that have never been alive.</p> <p>Identify that most living things live in habitats to which they are suited and describe how different habitats</p>		<p>Recognise that living things can be grouped in a variety of ways.</p> <p>Explore and use classification keys to help group, identify and name a variety of living things</p> <p>Recognise that environments can change and that this can</p>	<p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</p> <p>Describe the life process of reproduction in some plants and animals.</p>	<p>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals;</p>	<p>Relationships in an ecosystem:</p> <p>The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops.</p>

	<p>provide for the basic needs of different kinds of animals and plants, and how they depend on each other.</p> <p>Identify and name a variety of plants and animals in their habitats.</p> <p>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain.</p>		sometimes pose dangers to living things.		Give reasons for classifying plants and animals based on specific characteristics.	<p>The importance of plant reproduction through insect pollination in human food security.</p> <p>How organisms affect, and are affected by, their environment, including the accumulation of toxic materials.</p>
Evolution and Inheritance					<p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</p> <p>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>	<p>Inheritance, chromosomes, DNA and genes:</p> <p>Heredity as the process by which genetic information is transmitted from one generation to the next.</p> <p>A simple model of chromosomes, genes and DNA in heredity.</p> <p>Differences between species.</p> <p>The variation between individuals within a species being continuous or discontinuous.</p> <p>That variation within species means some organisms compete more successfully, which can drive natural selection.</p> <p>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.</p> <p>The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.</p>
Chemistry						
Materials (Including Rocks and Fossils and States of Matter)	<p>Distinguish between an object and the material from which it is made.</p> <p>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</p> <p>Describe the simple physical properties of a variety of everyday materials.</p> <p>Compare and group together a variety of everyday materials on the</p>	<p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p> <p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</p> <p>Recognise that soils are made from rocks and organic matter.</p>	<p>Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>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).</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the</p>	<p>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.</p> <p>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p>		<p>The particulate nature of matter:</p> <p>The properties of the different states of matter (solid, liquid and gas) in terms of the particle model.</p> <p>Changes of state in terms of the particle model.</p> <p>Atoms, elements and compounds:</p> <p>Differences between atoms, elements and compounds.</p>











	<p>basis of their simple physical properties.</p> <p>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</p> <p>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</p>		<p>rate of evaporation with temperature.</p>	<p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes.</p> <p>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.</p>		<p>Chemical symbols and formulae for elements and compounds.</p> <p>Conservation of mass changes of state and chemical reactions.</p> <p>Pure and impure substances:</p> <p>The concept of a pure substance.</p> <p>Mixtures, including dissolving.</p> <p>Diffusion in terms of the particle model.</p> <p>Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography.</p> <p>Chemical reactions:</p> <p>Chemical reactions as the rearrangement of atoms.</p> <p>Representing chemical reactions using formulae and using equations.</p> <p>Combustion, thermal decomposition, oxidation and displacement reactions.</p> <p>Defining acids and alkalis in terms of neutralisation reactions and the pH scale.</p> <p>What catalysts do.</p> <p>Energetics:</p> <p>Energy changes on changes of state.</p> <p>Exothermic and endothermic chemical reactions.</p> <p>The periodic table:</p> <p>The varying physical and chemical properties of different elements.</p> <p>The principles underpinning the periodic table.</p> <p>Materials:</p> <p>The order of metals and carbon in the reactivity series.</p> <p>the use of carbon in obtaining metals from metal oxides.</p> <p>Properties of ceramics, polymers and composites.</p> <p>Earth and atmosphere:</p>
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						<p>The composition of the Earth.</p> <p>The structure of the Earth.</p> <p>The rock cycle and the formation of igneous, sedimentary and metamorphic rocks.</p> <p>Earth as a source of limited resources and the need of recycling.</p> <p>The composition of the atmosphere.</p> <p>The production of carbon dioxide by human activity and the impact on climate.</p>
Physics						
Forces		<p>Compare how things move on different surfaces.</p> <p>Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance.</p> <p>Observe how magnets attract or repel each other and attract some materials and not others.</p> <p>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;</p> <p>Describe magnets as having two poles</p> <p>Predict whether 2 magnets will attract or repel each other, depending on which poles are facing.</p>		<p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</p> <p>Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.</p>		<p>Motion and forces:</p> <p>Describe motion in terms of speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time).</p> <p>A distance-time graph.</p> <p>Forces:</p> <p>Forces as pushes or pulls, arising from the interaction between 2 objects.</p> <p>Using force arrows in diagrams including balanced and unbalanced forces.</p> <p>Forces: associated with deforming objects; stretching and squashing.</p> <p>Forces are measured in newtons.</p> <p>Non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity.</p> <p>Pressure in fluids:</p> <p>Atmospheric pressure, decreases with increase of height.</p> <p>Pressure in liquids, increasing with depth; upthrust effects, floating and sinking.</p> <p>Pressure measured by ratio of force over area.</p> <p>Forces and motion:</p>











						<p>Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion.</p> <p>Change depending on direction of force and its size.</p> <p>Magnetism:</p> <p>Magnetic poles, attraction and repulsion.</p> <p>Magnetic fields by plotting with compass, representation by field lines.</p> <p>Earth's magnetism, compass and navigation.</p> <p>The magnetic effect of a current, electromagnets.</p>
Earth and Space				<p>Describe the movement of the Earth and other planets relative to the sun in the solar system.</p> <p>Describe the movement of the moon relative to the Earth.</p> <p>Describe the sun, Earth and moon as approximately spherical bodies.</p> <p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p>		<p>Space physics:</p> <p>Gravity force, weight = mass x gravitational field strength (g), on Earth $g=10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and sun.</p> <p>Our sun as a star, other stars in our galaxy, other galaxies.</p> <p>The seasons and the Earth's tilt, day length at different times of year, in different hemispheres.</p> <p>The light year as a unit of astronomical distance.</p>
Light		<p>Recognise that they need light in order to see things and that dark is the absence of light.</p> <p>Notice that light is reflected from surfaces.</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</p> <p>Recognise that shadows are formed when the light from a light source is blocked by an opaque object.</p> <p>Find patterns in the way that the size of shadows change.</p>			<p>Recognise that light appears to travel in straight lines.</p> <p>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.</p> <p>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.</p> <p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p>	<p>Light waves:</p> <p>The similarities and differences between light waves and waves in matter.</p> <p>Light waves travelling through a vacuum; speed of light.</p> <p>The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface.</p> <p>Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of</p>

						<p>convex lens in focusing and the human eye.</p> <p>Light transferring energy from source to absorber.</p> <p>Colours and the different frequencies of light.</p>
Sound			<p>Identify how sounds are made, associating some of them with something vibrating.</p> <p>Recognise that vibrations from sounds travel through a medium to the ear.</p> <p>Find patterns between the pitch of a sound and features of the object that produced it.</p> <p>Find patterns between the volume of a sound and the strength of the vibrations that produced it.</p> <p>Recognise that sounds get fainter as the distance from the sound source increases.</p>			<p>Sound waves:</p> <p>Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound.</p> <p>Sound needs a medium to travel, the speed of sound in air, in water, in solids.</p> <p>Sound is produced by vibrations of objects.</p> <p>The auditory range of humans and animals.</p>
Electricity			<p>Identify common appliances that run on electricity.</p> <p>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</p> <p>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.</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors.</p>		<p>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</p> <p>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.</p> <p>Use recognised symbols when representing a simple circuit in a diagram.</p>	<p>Electricity and electromagnetism:</p> <p>Electric current, measured in amperes.</p> <p>Potential difference, measured in volts and resistance, measured in ohms.</p> <p>Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects.</p> <p>The idea of electric field, forces acting across the space between objects not in contact.</p>

Progression of skills

										
KS1	To ask scientific questions	To plan an enquiry	To observe closely	To take measurements	To gather/record results	To present results	To interpret results	To draw conclusions	To make a prediction	To evaluate an enquiry
Classifying	Be able to ask a Yes/No questions to aid sorting	Identify the headings for the two groups (it is, it is not)	Be able to compare objects based on obvious, observable features e.g. size, shape, colour, texture etc.			Sort objects and living things into two group using a basic Venn diagram or simple table	Talk about the number of objects in each group i.e. which has more or less	Children in KS1 are not expected to draw conclusions. They are expected to make observations which will help them to answer questions. They do not have the subject knowledge to give reasons for what they observe so they cannot draw scientific conclusions.	Children in KS1 are not expected to make scientific predictions as they do not have the subject knowledge to do this. That does not mean that you should not ask children what they think may happen, but this will be based on experience or may simply be a guess.	Children in KS1 are not expected to evaluate. However, children should be encouraged to consider their method and adapt this where necessary.
Researching	Ask one or two simple questions linked to a topic					Present what they have learnt verbally or using pictures	Be able to answer their questions using simple sentences			
Comparative/fair testing	Identify the question to investigate from a scenario or choose a question from a range provided	Choose equipment to use and decide what to do and what to observe or measure in order to answer the question	Make observations linked to answering the question	When appropriate, measure using standard units where all the numbers are marked on the scale	Record data in simple prepared tables, pictorially or by taking photographs	Present what they learnt verbally, using pictures or block diagrams	Answer their question in simple sentences using their observations or measurements			
Observing over time	Ask a question about what might happen in the future based on an observation				Record data in simple prepared tables, pictorially or by taking photographs	Present what they learnt verbally or using pictures				
Pattern seeking	Ask a question that is looking for a pattern based on observations				Record data in simple, prepared tables and tally charts	Present what they learnt verbally				

										
LKS2	To ask scientific questions	To plan an enquiry	To observe closely	To take measurements	To gather/record results	To present results	To interpret results	To draw conclusions	To make a prediction	To evaluate an enquiry
Classifying	Be able to ask a range of Yes/No questions to aid sorting	Be able to put appropriate headings onto intersecting Venn and Carroll diagrams	Be able to compare objects based on more sophisticated, observable features. Present observations in labelled diagrams.			Sort objects and living things into groups using intersecting Venn and Carroll diagrams	Spot patterns in the data particularly two criteria with no examples e.g. there are no living things with wings and no legs	Draw simple conclusions, when appropriate, for patterns e.g. a flying insect with no legs might always crash land		Suggest improvement e.g. a wider range of objects – only looked at British trees. Suggest new questions arising from the investigation.
Researching	Ask a range of questions linked to a topic	Choose a source from a range provided				Present what they learnt verbally or using labelled diagrams	Be able to answer their questions using simple scientific language			Suggest limitations e.g. only had one book. Suggest new questions arising from the investigation.
Comparative/fair testing		Decide what to change and what to measure or observe	As for KS1	Measure using standard units where not all the numbers are marked on the scale, and take repeat readings where necessary	Prepare own tables to record data	Present data in bar charts	Refer directly to their evidence when answering their question	Where appropriate provide oral or written explanations for their findings	Use results from an investigation to make a prediction about a further result	Suggest improvements e.g. to method of taking measurements. Suggest new questions arising from the investigation.
Observing over time		Decide what to measure or observe. Decide how often to take a measurement.	Make a range of relevant observations	Measure using standard units where not all the numbers are marked on the scale. Use dataloggers to measure over time.		Present data in time graphs				
Pattern seeking		Decide what to measure or observe	As for KS1	Measure using standard units where not all the numbers are marked on the scale.		Use ICT package to present data as a scattergram				

											
UKS2	To ask scientific questions	To plan an enquiry	To observe closely	To take measurements	To gather/record results	To present results	To interpret results	To draw conclusions	To make a prediction	To evaluate an enquiry	
Classifying	Be able to ask a range of Yes/No questions to aid sorting and decide which ways of sorting will give useful information	Identify specific clear questions that will help to sort without ambiguity	Be able to compare not only based on physical properties but also on knowledge gained through previous enquiry			Create branching databases (tree diagrams) and keys to enable others to name living things and objects	Be able to talk about the features that objects and living things share and do not share based on the information in the key etc.	Be able to use data to show that living things and materials that are grouped together have more things in common than with things in other groups		Be able to explain using evidence that the branching database or classification key will only work for the living things or materials it was created for	
Researching	Ask a range of questions recognising that some can be answered through research and others may not	Choose suitable sources to use				Present what they learnt in a range of ways e.g. different graphic organisers	Be able to answer their questions using scientific evidence gained from a range of sources			Be able to talk about their degree of trust in the sources they used	
Comparative/fair testing	Ask a range of questions and identify the type of enquiry that will help to answer the questions. Ask further questions based on results.	Recognise and control variables where necessary	As for KS1	Measure using standard units using equipment that has scales involving decimals	Prepare own tables to record data, including columns for taking repeat readings	Choose an appropriate form of presentation, including line graphs	Be able to answer their question, describing causal relationships	Provide oral or written explanations for their findings	Use test results to make predictions for further investigations	Explain their degree of trust in their results e.g. precision in taking measurements, variables that may not have been controlled, and accuracy of results	
Observing over time							As for LKS2				Be able to answer their questions, describing the change over time
Pattern seeking							Choose an appropriate form of presentation, including scatter graphs				Be able to answer their questions identifying patterns