



Tuxford
Primary Academy

Science Curriculum

2023 - 2024

We empower | We respect | We care

Part of  **Diverse
Academies**



**Science provides the foundations for
understanding the world.**

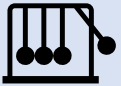




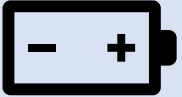







**Science has changed our lives and is vital
to the world's future prosperity.**

Big Ideas in Science

Science

Substantive knowledge

Physics			Biology			Chemistry	
							
Earth science	Forces	Energy	Animals including humans	Plants	Living things and their habitats	Materials	States of matter
							

Disciplinary knowledge

Knowledge of scientific methods						Knowledge of apparatus and techniques, including measurement			Knowledge of data analysis and presentation			Knowledge of how science uses evidence to develop explanations			
Models	Observation over time	Research	Classifying	Pattern seeking	Comparative / Fair test	Apparatus	Procedures	Safety	Graphs	Tables	Drawings	Evidence	Validity	Conclusions	Peer review

Supporting scientific enquiry



Practical work is important for children to:

- build their conceptual understanding (**substantive knowledge**)
- develop the science skills they need to work as scientists and illustrate how scientific enquiry develops the body of scientific understanding (**disciplinary knowledge**).

For teachers, what is critical is that they are clear about the purpose of the practical work they do with children – what substantive or disciplinary knowledge will they learn by doing it?

Engaging in scientific enquiry not only provides the opportunity for children to learn about the scientific enquiry process but, also helps them to “learn how scientific knowledge becomes established through scientific enquiry.”

When determining whether practical work is scientific enquiry or not is whether there is a question that will be answered by gathering data. If so, it is probably scientific enquiry. If not, it is just practical work.

The final point that teachers must consider before children engage in scientific enquiry is whether they have the knowledge, both substantive and disciplinary, that they need to be successful. Do they have the required conceptual understanding and the necessary science skills to do it? If not, they should be taught the knowledge they require before they engage in the scientific enquiry, or it should be scaffolded during it.

- **Comparative / fair testing** - Changing one variable to see it's effect on another, whilst keeping all others the same
- **Research** – Use secondary sources of information to answer scientific questions.
- **Observation over time** – Observing changes that occur over a period of time ranging from minutes to months
- **Pattern seeking** – Identifying patterns and looking for relationships in enquiries where variables are difficult to control.
- **Classifying** – Making observations to name, sort and organise items.
- **Problem solving** – Applying prior scientific knowledge to find answers to problems.

	Nursery		Reception			
	Year 1	Year 2	Year 3 & Year 4		Year 5	Year 6
	<p>Body Parts and senses To be able to identify the basic parts of the human body: including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth. To know that our eyes allow us to see. To know the basic parts of the eye. To know the functions of the basic parts of the eye. To know that ears allow us to hear. To know that our ears help us tell the direction sound is coming from. To know that sound is made up of vibrations. To know the 5 senses. To know that our tongue allows us to taste. To be able to describe a range of different flavours. To know why our sense of taste is important. To know that our skin helps us to feel. To know that our fingertips are sensitive to touch. To know that our sense of touch can identify different textures. To know that our nose allows us to smell. To know that we can smell many different flavours. To know that our sense of smell helps to keep us safe.</p> <p>Animals To be able to name a variety of common animals. To be able to identify the 5 groups of animals: amphibian, reptile, bird, fish, mammal</p>	<p>Lifecycles To know the basic needs of animals, including humans, for survival (water, food and air). To be able to order the stages of a human life cycle. To be able to identify each stage of a human life cycle. To be able to describe each stage of the human life cycle. To know that animals, including humans, have offspring which grow into adults. To be able to match offspring with their parents. To be able to identify features inherited from a parent. To know the lifecycle of a chicken. To know the stages of a butterfly's life. To be able to explain the life cycle of a butterfly and the process of metamorphosis. To know the stages of a frog's life cycle. To be able to describe how a frog moves between the stages in its life cycle.</p> <p>Staying healthy To know the basic needs of animals, including humans To know what humans need to survive To know the difference between basic human needs and the things humans want. To be able to name the 5 food groups. To be able to sort food into the 5 food groups. To know why the 5 food groups are important for human health. To know the importance of a balanced diet</p>	<p>Nutrition To 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 To know that there are 5 key food groups. To know how many portions of food from different food groups we should eat in a day. To know how food from each food group is essential for human growth and health. To know that food labels give information on the ingredients in food. To understand that food labels help us make healthy choices. To know that food labels give in depth information about the different food groups within a product.</p> <p>Skeleton and muscles <i>To understand that animals have different types of skeletons.</i> <i>To be able to identify which animals have an endoskeleton, exoskeleton and a hydrostatic skeleton.</i> <i>To be able to explain how animals' skeletons help them to move and survive.</i> <i>To know the functions of the human skeleton: support, protection and movement.</i> <i>To be able to identify the main bones in the human body: ulna, tibia, fibular, radius, humerus, spine, rib cage, vertebrate, skull, pelvis</i> <i>To be able to match animals to their skeletons.</i></p>	<p>Teeth and the digestive system To identify the main organs of the human digestive system: mouth, tongue, teeth, oesophagus, stomach, and small and large intestine. To be able to create an accurate diagram of the main organs of the human digestive system. To know the role of the digestive system and the organs within it. To know the functions of the organs in the digestive system. To be able to use a model of the digestive system to explain the journey of food. To know the different types of human teeth. To be able to explain the functions of the different types of human teeth. To know why humans have 2 sets of human teeth. To know how to care for our teeth.</p> <p>Food chains <i>To be able to construct and interpret a variety of food chains.</i> <i>To be identify the key parts of a food chain: producers, predators and prey</i> <i>To be able to create a food chain within a chosen ecosystem.</i> <i>To know why it is important to keep food chains balanced.</i> <i>To be able to identify threats to living things within their chosen ecosystem.</i></p>	<p>Human development To be able to describe the changes as humans develop to old age. To know the key stages of a mammal's life cycle. To be able to identify developments during each stage of a life cycle. To know what gestation is. To know reasons behind extreme gestation periods. To know the stages that occur during pregnancy. To know that all children grow. To know some ways that the growth of children is measured. To know that all children go through puberty. To know the changes that take place during puberty. To know the changes experienced by boys and girls. To know some key signs of ageing in humans. To know that humans age differently depending on their lifestyle. To be able to suggest ways to stay healthy in old age.</p> <p>Circulatory system To be able to identify and name the main parts of the human circulatory system. To be able to describe the structure and function of the heart. To be able to describe how the blood moves around the heart. To be able to describe the functions of the blood vessels. To know that there is oxygenated and deoxygenated blood.</p>	<p>Evolution and inheritance To understand that living things produce offspring of the same kind, but that normally offspring vary and are not identical to their parents. To know how an animal is adapted to its environment and that adaptation may lead to evolution. To know how an animals adaptation helps it to survive in the habitat (<i>Darwin's finches, giraffe's neck, insulating fur on the arctic fox</i>) To know how a plant is adapted to its environment and that adaptation may lead to evolution. To know how a plant adaptation helps it to survive in the habitat. To understand how fossils provide information about living things that are now extinct. To know about the work of Mary Anning. To be able to compare extinct animals with those that are living and identify adaptation. To know how natural selection causes living things to evolve over time. To know about the work of Charles Darwin. To know why the theory of evolution was not accepted at first. To know how humans have evolved. To be able to compare and contrast Neanderthals and homo sapiens.</p>

	Year 1	Year 2	Year 3 & Year 4		Year 5	Year 6
Biology: Animals including humans	<p>Animals contd. To be able to describe the key characteristics of the 5 animal groups. To be able to name a variety of common birds and mammals. To be able to name a variety of common amphibians, reptiles and fish. To know that animals eat different things. To be able to group animals based on their diet. To know the difference between herbivores, carnivores and omnivore. To know that some animals are wild and some are kept as pets. To be able to describe the needs of a pet.</p>	<p>Staying healthy contd. To be able to give examples of foods that form part of a healthy diet. To know that eating pre-cooked or processed food is not always a healthy choice. To know that exercising regularly is important for our health. To know how exercise impacts our bodies.</p>	<p>Skeleton and muscles contd. <i>To be able to identify how animals' skeletons have adapted to help them move in their environment.</i> <i>To be able to explain the functions of the bones within animal skeletons.</i> <i>To know that we have voluntary and involuntary muscles.</i> <i>To be able to explain how muscles work.</i></p>		<p>Circulatory system contd. To be able to describe the composition of the blood. To know of the issues surrounding restricted arteries. To be able to explain the function of cells within the blood. To be able to explain how water and nutrients are transported. To be able to define osmosis and diffusion. To be able to accurately measure pulse. To know how lifestyle choices can affect health. To be able to describe the impact of drugs/alcohol on health. To be able to describe some drugs used to support the circulatory system.</p>	

Nursery		Reception			
Year 1	Year 2	Year 3 & Year 4		Year 5	Year 6
	<p>Living things and their habitats</p> <p>To know that there are things that are living, dead or have never been alive.</p> <p>To be able to identify and classify objects into living, dead or never been alive.</p> <p>To know the 7 characteristics of living things.</p> <p>To be able to identify which animals might live in a range of habitats.</p> <p>To know that most living things live in habitats to which they are suited.</p> <p>To know the difference between a habitat and a microhabitat.</p> <p>To be able to identify and name a variety of plants and animals in their habitats.</p> <p>To know that living things depend on each other for survival.</p> <p>To know that all animals need to eat to survive.</p> <p>What is a food chain?</p> <p>To know what a food chain is.</p> <p>To know what could affect a food chain.</p> <p>To know that food we eat comes from a natural source.</p>		<p>Living things and their habitats</p> <p>To know that living things can be grouped in a variety of ways.</p> <p>To be able to use classification keys to help group, identify and name a variety of living things in their local and wider environment.</p> <p>To know that environments can change and that this can sometimes pose dangers to living things.</p> <p>To understand that ecosystems are affected by changes in the seasons.</p> <p>To understand that habitats around the world experience different seasons which changes their ecosystem.</p> <p>To understand that it is not just the seasons which cause ecosystems to change.</p> <p>To understand human impact on the environment through deforestation.</p> <p>To know what measures humans can take to protect the rainforests.</p> <p>To know what air pollution is.</p> <p>To know what contributes to air pollution.</p> <p>To be able to identify the impact air pollution has on the environment and human health.</p> <p>To know how water pollution is caused.</p> <p>To be able to explain the impact of different kinds of water pollution</p> <p>To be able to identify how to prevent water pollution.</p> <p>To know why it is important to conserve water.</p> <p>To be able to explain how to conserve water and the consequences of water shortages.</p> <p>To know of ways that humans can protect the environment.</p>	<p>Lifecycles and reproduction in plants and animals</p> <p>To know what plants need to grow strong and healthy.</p> <p>To know that plants can reproduce sexually and asexually.</p> <p>To know that plants are living things.</p> <p>To know not all mammals have the same life cycle.</p> <p>To know the 3 types of mammal.</p> <p>To know what a life cycle is.</p> <p>To know the life cycle of an amphibian.</p> <p>To know the life cycle of an insect.</p> <p>To be able to compare the process of metamorphosis in amphibians and insects.</p> <p>To know key facts about the structure of an egg.</p> <p>To be able to describe the differences between a mammal and a bird or reptile life cycle.</p> <p>To know the life cycle of birds and reptiles.</p> <p>To be able to describe the importance of documenting living things and highlighting their decline in the world.</p> <p>To know about the work of David Attenborough and Jane Goodall.</p> <p>To know the importance of studying living organisms.</p> <p>To be able to suggest ideas for conservation of living things.</p>	<p>The natural world</p> <p>To be able to recall MRS GREN and how living organisms follow these rules.</p> <p>To know that living organisms can be arranged into kingdoms.</p> <p>To be able to give reasons for classifying plants and animals based on specific characteristics.</p> <p>To know about the work of Carl Linnaeus.</p> <p>To know how different organisms can be classified using the Linnaean system.</p> <p>To know that microorganisms are microscopic and cannot be seen with the naked eye.</p> <p>To know how micro-organisms are both helpful and harmful.</p> <p>To know the differences between fungi and other organisms.</p> <p>To know that fungi are a separate kingdom to plants.</p>

Nursery			Reception		
Year 1	Year 2	Year 3 & Year 4		Year 5	Year 6
<p>Plants To be able to identify and name a variety of common wild and garden plants. To be able to explain how to plant a seed To be able to say what is the same and what is different between 2 flowering plants. To know the parts of a plant. (leaves, flowers (blossom), petals, fruit, roots, bulb, seed, branches, stem) To know the parts of a tree. (leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches) To be able to group plants according to their features. To know that deciduous trees change throughout the year. To know how a deciduous tree changes through the year. To know that an evergreen tree stays green throughout the year. To be able to make comparisons between a deciduous tree and an evergreen tree. To know that plants are a source of food. To know that plants grow over time.</p>	<p>Plants To know the difference between a bulb and a seed. To know that plants need space, water, sunlight and a suitable temperature to grow. To know the life cycle of a plant. To be able to identify and sort plants according to their habitats. To be able to explain how plants adapt to suit their environment.</p>	<p>Plants To 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. To be able to identify the parts of a plant: roots, stem/trunk, leaves and flowers. To be able to describe the functions of the parts of a flowering plant. To know how water is transported within plants. To be able to identify the reproductive parts in a flower. To be able to explain the functions of the reproductive parts in a flower. To know how flowering plants reproduce. To know that seed dispersal is a way in which some plants reproduce, including pollination, seed formation and seed dispersal.</p>			

Chemistry: States of matter	Nursery			Reception		
	Year 1	Year 2	Year 3 & Year 4		Year 5	Year 6
				<p>States of matter</p> <p>To know the 3 states of matter: solid, liquid, gas.</p> <p>To be able to describe the properties of the 3 states of matter.</p> <p>To be able to classify substances based on their state of matter.</p> <p>To know how particles behave in each state of matter.</p> <p>To be able to explain how substances change state.</p> <p>To know the temperature at which water changes state.</p> <p>To know what a 'melting point' means.</p> <p>To know what freezing and boiling point means.</p> <p>What is evaporation?</p> <p>To be able to define evaporation.</p> <p>To be able to define condensation.</p> <p>To know the stages of the water cycle.</p> <p>To know the importance of evaporation and condensation within the water cycle.</p> <p>To be able to describe the water cycle in detail.</p>		

Nursery			Reception		
Year 1	Year 2	Year 3 & Year 4		Year 5	Year 6
<p>Everyday materials</p> <p>To know that a material is</p> <p>To be able to identify a variety of everyday materials, (including wood, plastic, glass, metal, water, and rock / move on to explore brick, paper, fabrics, elastic, foil)</p> <p>To be able to describe everyday materials</p> <p>To know that all objects are made from materials</p> <p>To be able to identify what material an object is made from</p> <p>To know that different objects can be made from the same material</p> <p>To be able to describe the simple properties of everyday materials (hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent)</p> <p>To be able to explain why materials are chosen for particular objects</p> <p>To know that some materials are natural and some are manmade</p> <p>To be able to identify natural and manmade materials</p> <p>To know that natural and manmade materials are used for different purposes</p> <p>To know that some objects float and some objects sink</p> <p>To be able to predict and identify if an object will float or sink</p> <p>To know that some materials soak up water</p> <p>To know that some materials are absorbent and some are not absorbent</p> <p>To know that non-absorbent materials are used in objects that need to be waterproof</p>	<p>Uses of everyday materials</p> <p>To know what a material is.</p> <p>To know the properties of a variety of everyday materials.</p> <p>To be able to explain why some materials are suitable for specific uses.</p> <p>To know that some materials are stronger than others.</p> <p>To be able to compare the strength of different materials.</p> <p>To know that materials differ in strength and can be strengthened by changing their structure.</p> <p>To know that the shapes of objects can be changed by stretching.</p> <p>To be able to compare how the shapes of objects change when they are stretched.</p> <p>To be able to compare how some objects change after stretching while other objects return to their original form.</p> <p>To know that shapes of objects can be changed by twisting, bending, squashing or stretching.</p> <p>To be able to compare how the shapes of objects change when they are twisted, bent, squashed or stretched.</p>	<p>Rocks</p> <p>To know that igneous rocks come from beneath the Earth's surface.</p> <p>To know how igneous rocks are formed on Earth's surface.</p> <p>To be able to explain the difference between intrusive and extrusive igneous rock.</p> <p>To know the three types of rock that are formed on Earth.</p> <p>To be able to identify the properties of rocks by carrying out tests.</p> <p>To be able to explain the difference between igneous, sedimentary and metamorphic rocks.</p> <p>To be able to identify the different types of weathering.</p> <p>To be able to explain the effects weathering has on rocks.</p> <p>To know that water can cause rocks to erode.</p> <p>To be able to explain how water causes rocks to erode.</p> <p>To know what a fossil is.</p> <p>To know how a fossil is created.</p> <p>To know that soils are made from rocks and organic matter.</p> <p>To be able to name some different types of soil.</p> <p>To be able to describe the properties of different soils.</p>		<p>Properties and changes of materials</p> <p>To know that some materials will dissolve in liquid to form a solution.</p> <p>To be able to describe how to recover a substance from a solution.</p> <p>To know that there are three states of matter: solids, liquids and gases.</p> <p>To know how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>To know that evaporating, filtering, sieving, melting and dissolving are changes of state that are reversible changes.</p> <p>To be able to describe how the method used to reverse a physical change works.</p> <p>To be able to recognise that melting and dissolving are different processes.</p> <p>To be able to name some irreversible changes.</p> <p>To know why particular changes are irreversible and what new products have been made.</p> <p>To know that rusting is an irreversible change.</p> <p>To know why rusting is a problem and how to prevent it.</p> <p>To know the 3 factors a fire needs to burn.</p> <p>To know what the fire triangle is.</p> <p>To be able to describe and explain different methods for extinguishing a fire.</p> <p>To know that burning is an irreversible change.</p> <p>To be able to apply knowledge of the fire triangle to alternative extinguishing methods.</p> <p>How do chemists create new materials?</p> <p>E.g. Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.</p>	

Physics: Earth science	Nursery			Reception		
	Year 1	Year 2	Year 3 & Year 4		Year 5	Year 6
	<p>Seasons</p> <p>To know that there are 4 seasons.</p> <p>To be able to name the 4 seasons.</p> <p>To know that autumn is a season.</p> <p>To know the different weather that happens in autumn.</p> <p>To know that the days get shorter in autumn.</p> <p>To know that winter is a season.</p> <p>To know the different weather that happens in winter.</p> <p>To know that the days are short in winter.</p> <p>To know that spring is a season.</p> <p>To know the different weather that happens in spring.</p> <p>To be able to make comparisons between the different seasons.</p> <p>To know the different weather that happens in summer.</p> <p>To know that summer is a season.</p> <p>To know the different weather that happens in summer.</p>					<p>Earth and space</p> <p>To know the key characteristics of a planet</p> <p>To know the order of the planets from the Sun.</p> <p>To know that the sun is a star at the centre of our solar system.</p> <p>To know that our solar system has 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006).</p> <p>To be able to describe the Sun, Earth, moon and other celestial bodies as spheres.</p> <p>To know the differences between a heliocentric and geocentric model of the solar system</p> <p>To know that attitudes and knowledge about the solar system has changed over time.</p> <p>To know the geocentric model of the solar system gave way to the heliocentric model.</p> <p>To know about the work of the scientists Ptolemy, Alhazen and Copernicus.</p> <p>To know how Earth moves in space.</p> <p>To know how the Sun transitions across the sky.</p> <p>To know how night and day happen.</p> <p>To know that time can be different in various parts of the world</p> <p>To know how time can be recorded using a 'solar clock'.</p> <p>To be able to describe how the Earth and Moon move relative to the Sun.</p> <p>To be able to describe the movement of the Moon relative to the Earth.</p> <p>To be able to explain that the Moon orbits the Earth, not the Sun.</p>

Nursery			Reception		
Year 1	Year 2	Year 3 & Year 4		Year 5	Year 6
		<p>Forces and magnets</p> <p>To be able to identify different types of forces.</p> <p>To be able to identify different types of forces and describe the effect they have on an object.</p> <p>To be able to identify different types of forces and explain how they impact the movement of an object.</p> <p>To be able to compare how things move on different surfaces.</p> <p>To know why some surfaces slow objects down.</p> <p>To know how friction can be increased or decreased.</p> <p>attract and repel?</p> <p>To know that magnets have two poles.</p> <p>To be able to predict whether 2 magnets will attract or repel each other, depending on which poles are facing.</p> <p>To be able to name some different types of magnet.</p> <p>To know some everyday uses for magnets.</p> <p>To know how magnetic materials behave</p> <p>To be able to identify a range of materials which are magnetic.</p> <p>To know that magnetic forces can act at a distance.</p> <p>To know how magnetic forces act at a distance.</p> <p>To know what a compass is.</p> <p>To know the four main compass points.</p> <p>To be able to explain how a compass works.</p>		<p>Forces</p> <p>To know about the life and work of Isaac Newton.</p> <p>To know about the life and work of Galileo Galilei.</p> <p>To know the influence gravity has on the universe.</p> <p>To know that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>To investigate the relationship between mass and gravity.</p> <p>To know how air resistance acts on objects.</p> <p>To know how water resistance acts on objects.</p> <p>To be able to describe the forces acting on an object floating in water.</p> <p>To be able to identify the similarities and differences between air and water resistance.</p> <p>To know how friction acts on objects.</p> <p>To be able to accurately use a Newton meter to measure a force.</p> <p>To be able to describe ways of changing the size of a frictional force.</p> <p>To be able to explain how gears, levers and pulleys work.</p>	

Nursery			Reception		
Year 1	Year 2	Year 3 & Year 4		Year 5	Year 6
		<p>Light</p> <p>To be able to identify light sources.</p> <p>To know the difference between natural and artificial sources of light.</p> <p>To be able to explain why certain objects are sources of light and why others are not.</p> <p>To know that sunlight can damage our skin and our eyes.</p> <p>To be able to explain the effectiveness of suncream as protection against the sunlight</p> <p>To know that some objects are a light source and some are reflectors.</p> <p>To know which materials are good reflectors.</p> <p>To be able to explain why some materials are better reflectors than others.</p> <p>To know that shadows are formed when the light from a light source is blocked by an opaque object.</p> <p>To understand that shadows change throughout the day</p> <p>To be able to explain how and why shadows change throughout the day</p> <p>To know that we need light in order to see things and that dark is the absence of light.</p> <p>To know that the size and shape of a shadow can change.</p> <p>To know how to change the size and shape of a shadow.</p> <p>To be able to explain why the size and shape of a shadow can change</p>	<p>Sound</p> <p>To know that sound is created by vibrations.</p> <p>To be able to explain how sound is created and how it travels from an object to the ear.</p> <p>To know how sound is created, travels and is interpreted by the brain.</p> <p>To know that sounds can travel through air, liquids and solids.</p> <p>To be able to explain how sound waves travel through air, liquids and solids.</p> <p>To be able to compare how sound waves travel through air, liquids and solids.</p> <p>To know that some materials absorb sound and some materials reflect sound.</p> <p>To know that materials that absorb sound are sound insulators.</p> <p>To know why some materials absorb sound.</p> <p>To know that the volume of sound is measured in decibels.</p> <p>To know that the volume of a sound is dependent on how much energy or power the sound source is given.</p> <p>To know that the volume of sound increases so too does the amplitude, or height, of the sound waves.</p> <p>To know that pitch is how low or high a sound is.</p> <p>To know that pitch is caused by the speed of the sound source's vibrations.</p> <p>To know how a sound wave is different for a high pitch and a low pitch.</p> <p>To know that sound fades as it travels.</p> <p>To know why sound fades as it travels.</p> <p>To be able to explain the relationship between distance and volume.</p>		<p>Electricity</p> <p>To know the parts of an electric circuit (<i>lamp, buzzer, cells, switches, bulb, motor</i>)</p> <p>To know there are recognised symbols to represent a simple circuit diagram.</p> <p>To know that batteries are a store of energy. (<i>The energy pushes electricity around the circuit, When the battery's energy is gone it stops pushing.</i>)</p> <p>To know that Voltage measures the 'push' of energy around the circuit.</p> <p>To know how the brightness of a bulb is affected by the voltage / number of cells in the circuit.</p> <p>To be able to explain how to fix issues in a circuit.</p> <p>To know which materials are electrical conductors and insulators.</p> <p>Light and optics</p> <p>To know that light travels in straight lines.</p> <p>To know that light is reflected off surfaces so that we can see it.</p> <p>To know how to create a shadow.</p> <p>To know that shadows change length depending on how far away they are from a light source.</p> <p>To know what refraction is.</p> <p>To know what reflection is.</p> <p>To know what happens when light is refracted.</p> <p>To understand how our eyes respond to light.</p> <p>To know the names and role of parts of the eye – cornea, iris, lens, retina, pupil, optic nerve</p> <p>To know the meaning of the terms far sighted and near sighted.</p>

	Year 1	Year 2	Year 3 & Year 4	Year 5	Year 6
			<p>Electricity</p> <p>To be able to identify common appliances that run on electricity.</p> <p>To understand the dangers of using electrical appliances.</p> <p>To know how to keep safe when using electrical appliances.</p> <p>To be able to identify electrical components: cells, wires, bulbs, switches and buzzers.</p> <p>To be able to create a simple electrical circuit.</p> <p>To be able to explain how a simple electrical circuit works.</p> <p>To be able to predict if a simple electrical circuit will work.</p> <p>To know the difference between a complete and an incomplete circuit.</p> <p>To know the difference between an insulator and a conductor.</p> <p>To be able to recognise some common conductors and insulators.</p> <p>To know how a switch works.</p> <p>To be able to explain how an electrical switch works.</p> <p>To be able to apply knowledge of how a switch works to create a switch.</p>		

Classifying	Nursery			Reception		
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	<p>Ask scientific questions: Be able to ask a Yes/No questions to aid sorting</p> <p>Plan an enquiry: Identify the headings for the two groups (it is, it is not)</p> <p>Observe closely: Be able to compare objects based on obvious, observable features e.g. size, shape, colour, texture etc.</p> <p>Present results: Sort objects and living things into two group using a basic Venn diagram or simple table</p> <p>Interpret results: Talk about the number of objects in each group i.e. which has more or less.</p>	<p>Ask scientific questions: Be able to ask a Yes/No questions to aid sorting</p> <p>Plan an enquiry: Identify the headings for the two groups (it is, it is not)</p> <p>Observe closely: Be able to compare objects based on obvious, observable features e.g. size, shape, colour, texture etc.</p> <p>Present results: Sort objects and living things into two group using a basic Venn diagram or simple table</p> <p>Interpret results: Talk about the number of objects in each group i.e. which has more or less.</p>	<p>Ask scientific questions: Be able to ask a range of yes/no questions to aid sorting</p> <p>Plan an enquiry: Be able to put appropriate headings onto intersecting Venn and Carroll diagrams</p> <p>Observe closely: Be able to compare objects based on more sophisticated, observable features. Present observations in labelled diagrams</p> <p>Present results: Sort objects and living things into groups using intersecting Venn and Carroll diagrams</p> <p>Interpret results: Spot patterns in the data particularly two criteria with no examples e.g. there are no living things with wings and no legs</p> <p>Draw conclusions: Draw simple conclusions when appropriate for patterns e.g. a flying insect with no legs might always crash land</p> <p>Evaluate an enquiry: Suggest improvement e.g. a wider range of objects – only looked a British trees. Suggest new questions arising from the investigation.</p>	<p>Ask scientific questions: Be able to ask a range of yes/no questions to aid sorting</p> <p>Plan an enquiry: Be able to put appropriate headings onto intersecting Venn and Carroll diagrams</p> <p>Observe closely: Be able to compare objects based on more sophisticated, observable features. Present observations in labelled diagrams</p> <p>Present results: Sort objects and living things into groups using intersecting Venn and Carroll diagrams</p> <p>Interpret results: Spot patterns in the data particularly two criteria with no examples e.g. there are no living things with wings and no legs</p> <p>Draw conclusions: Draw simple conclusions when appropriate for patterns e.g. a flying insect with no legs might always crash land</p> <p>Evaluate an enquiry: Suggest improvement e.g. a wider range of objects – only looked a British trees. Suggest new questions arising from the investigation.</p>	<p>Ask scientific questions: Be able to ask a range of yes/no questions to aid sorting and decide which ways of sorting will give useful information</p> <p>Plan an enquiry: Identify specific clear questions that will help to sort without ambiguity</p> <p>Observe closely: Be able to compare not only based on physical properties but also on knowledge gained through previous enquiry</p> <p>Present results: Create branching databases (tree diagrams) and keys to enable others to name living things and objects</p> <p>Interpret results: 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</p> <p>Draw conclusions: 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</p> <p>Evaluate an enquiry: 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</p>	<p>Ask scientific questions: Be able to ask a range of yes/no questions to aid sorting and decide which ways of sorting will give useful information</p> <p>Plan an enquiry: Identify specific clear questions that will help to sort without ambiguity</p> <p>Observe closely: Be able to compare not only based on physical properties but also on knowledge gained through previous enquiry</p> <p>Present results: Create branching databases (tree diagrams) and keys to enable others to name living things and objects</p> <p>Interpret results: 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</p> <p>Draw conclusions: 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</p> <p>Evaluate an enquiry: 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</p>

Nursery			Reception		
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Ask scientific questions: Ask a question about what might happen in the future based on an observation</p> <p>Plan an enquiry: Choose equipment to use, decide what to do and what to observe or measure in order to answer the question</p> <p>Observe closely: Make observations linked to answering the question</p> <p>Take measurements: When appropriate, measure using standard units where all the numbers are marked on the scale</p> <p>Gather / record results: Record data in simple prepared tables, pictorially or by taking photographs</p> <p>Present results: Present what they learnt verbally or using pictures</p> <p>Interpret results: Answer their question in simple sentences using their observations or measurements</p>	<p>Ask scientific questions: Ask a question about what might happen in the future based on an observation</p> <p>Plan an enquiry: Choose equipment to use, decide what to do and what to observe or measure in order to answer the question</p> <p>Observe closely: Make observations linked to answering the question</p> <p>Take measurements: When appropriate, measure using standard units where all the numbers are marked on the scale</p> <p>Gather / record results: Record data in simple prepared tables, pictorially or by taking photographs</p> <p>Present results: Present what they learnt verbally or using pictures</p> <p>Interpret results: Answer their question in simple sentences using their observations or measurements</p>	<p>Ask scientific questions: Ask a range of questions linked to a topic</p> <p>Plan an enquiry: Decide what to measure or observe. Decide how often to take a measurement</p> <p>Observe closely: Make a range of relevant observations</p> <p>Take measurements: Measure using standard units where not all the numbers are marked on the scale. Use dataloggers to measure over time</p> <p>Gather / record results: Prepare own tables to record data</p> <p>Present results: Present data in time graphs</p> <p>Interpret results: Refer directly to their evidence when answering their question</p> <p>Draw conclusions: Where appropriate provide oral or written explanations for their findings</p> <p>Make a prediction: Use results from an investigation to make a prediction about a further result</p> <p>Evaluate an enquiry: Suggest improvements e.g. to method of taking measurements. Suggest new questions arising from the investigation.</p>	<p>Ask scientific questions: Ask a range of questions linked to a topic</p> <p>Plan an enquiry: Decide what to measure or observe. Decide how often to take a measurement</p> <p>Observe closely: Make a range of relevant observations</p> <p>Take measurements: Measure using standard units where not all the numbers are marked on the scale. Use dataloggers to measure over time</p> <p>Gather / record results: Prepare own tables to record data</p> <p>Present results: Present data in time graphs</p> <p>Interpret results: Refer directly to their evidence when answering their question</p> <p>Draw conclusions: Where appropriate provide oral or written explanations for their findings</p> <p>Make a prediction: Use results from an investigation to make a prediction about a further result</p> <p>Evaluate an enquiry: Suggest improvements e.g. to method of taking measurements. Suggest new questions arising from the investigation.</p>	<p>Ask scientific questions: Ask a range of questions and identify the type of enquiry that will help to answer the questions. Ask further questions based on results</p> <p>Plan an enquiry: Recognise and control variables where necessary.</p> <p>Observe closely: Make observations linked to answering the question</p> <p>Take measurements: Measure using standard units using equipment that has scales involving decimals</p> <p>Gather / record results: Prepare own tables to record data</p> <p>Present results: Choose an appropriate form of presentation including line graphs</p> <p>Interpret results: Be able to answer their questions, describing the change over time</p> <p>Draw conclusions: Provide oral or written explanations for their findings</p> <p>Make a prediction: Use test results to make predictions for further investigations</p> <p>Evaluate an enquiry: 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</p>	<p>Ask scientific questions: Ask a range of questions and identify the type of enquiry that will help to answer the questions. Ask further questions based on results</p> <p>Plan an enquiry: Recognise and control variables where necessary.</p> <p>Observe closely: Make observations linked to answering the question</p> <p>Take measurements: Measure using standard units using equipment that has scales involving decimals</p> <p>Gather / record results: Prepare own tables to record data</p> <p>Present results: Choose an appropriate form of presentation including line graphs</p> <p>Interpret results: Be able to answer their questions, describing the change over time</p> <p>Draw conclusions: Provide oral or written explanations for their findings</p> <p>Make a prediction: Use test results to make predictions for further investigations</p> <p>Evaluate an enquiry: 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</p>

Nursery			Reception		
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Ask scientific questions: Ask a question that is looking for a pattern based on observations</p> <p>Gather / record results: Record data in simple, prepared tables and tally charts</p> <p>Present results: Present what they learnt verbally</p>	<p>Ask scientific questions: Ask a question that is looking for a pattern based on observations</p> <p>Gather / record results: Record data in simple, prepared tables and tally charts</p> <p>Present results: Present</p>	<p>Ask scientific questions: Ask a range of questions linked to a topic</p> <p>Plan an enquiry: Decide what to measure or observe</p> <p>Observe closely: Make observations linked to answering the question</p> <p>Take measurements: Measure using standard units where not all the numbers are marked on the scale.</p> <p>Gather / record results: Prepare own tables to record data</p> <p>Present results: Use ICT package to present data as a scattergram</p> <p>Interpret results: Refer directly to their evidence when answering their question</p> <p>Draw conclusions: Where appropriate provide oral or written explanations for their findings</p> <p>Make a prediction: Use results from an investigation to make a prediction about a further result</p> <p>Evaluate an enquiry: Suggest improvements e.g. to method of taking measurements. Suggest new questions arising from the investigation.</p>	<p>Ask scientific questions: Ask a range of questions linked to a topic</p> <p>Plan an enquiry: Decide what to measure or observe</p> <p>Observe closely: Make observations linked to answering the question</p> <p>Take measurements: Measure using standard units where not all the numbers are marked on the scale.</p> <p>Gather / record results: Prepare own tables to record data</p> <p>Present results: Use ICT package to present data as a scattergram</p> <p>Interpret results: Refer directly to their evidence when answering their question</p> <p>Draw conclusions: Where appropriate provide oral or written explanations for their findings</p> <p>Make a prediction: Use results from an investigation to make a prediction about a further result</p> <p>Evaluate an enquiry: Suggest improvements e.g. to method of taking measurements. Suggest new questions arising from the investigation.</p>	<p>Ask scientific questions: Ask a range of questions and identify the type of enquiry that will help to answer the questions. Ask further questions based on results</p> <p>Plan an enquiry: Recognise and control variables where necessary.</p> <p>Observe closely: Make observations linked to answering the question</p> <p>Take measurements: Measure using standard units using equipment that has scales involving decimals</p> <p>Gather / record results: Prepare own tables to record data</p> <p>Present results: Choose an appropriate form of presentation including scatter graphs</p> <p>Interpret results: Be able to answer their questions identifying patterns</p> <p>Draw conclusions: Provide oral or written explanations for their findings</p> <p>Make a prediction: Use test results to make predictions for further investigations</p> <p>Evaluate an enquiry: 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</p>	<p>Ask scientific questions: Ask a range of questions and identify the type of enquiry that will help to answer the questions. Ask further questions based on results</p> <p>Plan an enquiry: Recognise and control variables where necessary.</p> <p>Observe closely: Make observations linked to answering the question</p> <p>Take measurements: Measure using standard units using equipment that has scales involving decimals</p> <p>Gather / record results: Prepare own tables to record data</p> <p>Present results: Choose an appropriate form of presentation including scatter graphs</p> <p>Interpret results: Be able to answer their questions identifying patterns</p> <p>Draw conclusions: Provide oral or written explanations for their findings</p> <p>Make a prediction: Use test results to make predictions for further investigations</p> <p>Evaluate an enquiry: 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</p>

Nursery

Reception

Year 1

Year 2

Year 3

Year 4

Year 5

Year 6

Ask scientific questions: Identify the question to investigate from a scenario or choose a question from a range provided
Plan an enquiry: Choose equipment to use, decide what to do and what to observe or measure in order to answer the question
Observe closely: Make observations linked to answering the question
Take measurements: When appropriate, measure using standard units where all the numbers are marked on the scale
Gather / record results: Record data in simple prepared tables, pictorially or by taking photographs
Present results: Present what they learnt verbally, using pictures or block diagrams
Interpret results: Answer their question in simple sentences using their observations or measurements

Ask scientific questions: Identify the question to investigate from a scenario or choose a question from a range provided
Plan an enquiry: Choose equipment to use, decide what to do and what to observe or measure in order to answer the question
Observe closely: Make observations linked to answering the question
Take measurements: When appropriate, measure using standard units where all the numbers are marked on the scale
Gather / record results: Record data in simple prepared tables, pictorially or by taking photographs
Present results: Present what they learnt verbally, using pictures or block diagrams
Interpret results: Answer their question in simple sentences using their observations or measurements

Ask scientific questions: Ask a range of questions linked to a topic
Plan an enquiry: Decide what to change and what to measure or observe
Observe closely: Make observations linked to answering the question
Take measurements: Measure using standard units where not all the numbers are marked on the scale, take repeat readings where necessary
Gather / record results: Prepare own tables to record data
Present results: Present data in bar charts
Interpret results: Refer directly to their evidence when answering their question
Draw conclusions: Where appropriate provide oral or written explanations for their findings
Make a prediction: Use results from an investigation to make a prediction about a further result
Evaluate an enquiry: Suggest improvements e.g. to method of taking measurements. Suggest new questions arising from the investigation.

Ask scientific questions: Ask a range of questions linked to a topic
Plan an enquiry: Decide what to change and what to measure or observe
Observe closely: Make observations linked to answering the question
Take measurements: Measure using standard units where not all the numbers are marked on the scale, take repeat readings where necessary
Gather / record results: Prepare own tables to record data
Present results: Present data in bar charts
Interpret results: Refer directly to their evidence when answering their question
Draw conclusions: Where appropriate provide oral or written explanations for their findings
Make a prediction: Use results from an investigation to make a prediction about a further result
Evaluate an enquiry: Suggest improvements e.g. to method of taking measurements. Suggest new questions arising from the investigation.

Ask scientific questions: Ask a range of questions and identify the type of enquiry that will help to answer the questions. Ask further questions based on results
Plan an enquiry: Recognise and control variables where necessary.
Observe closely: Make observations linked to answering the question
Take measurements: Measure using standard units using equipment that has scales involving decimals
Gather / record results: Prepare own tables to record data, including columns for taking repeat readings
Present results: Choose an appropriate form of presentation including line graphs
Interpret results: Be able to answer their question, describing causal relationships
Draw conclusions: Provide oral or written explanations for their findings
Make a prediction: Use test results to make predictions for further investigations
Evaluate an enquiry: 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

Ask scientific questions: Ask a range of questions and identify the type of enquiry that will help to answer the questions. Ask further questions based on results
Plan an enquiry: Recognise and control variables where necessary.
Observe closely: Make observations linked to answering the question
Take measurements: Measure using standard units using equipment that has scales involving decimals
Gather / record results: Prepare own tables to record data, including columns for taking repeat readings
Present results: Choose an appropriate form of presentation including line graphs
Interpret results: Be able to answer their question, describing causal relationships
Draw conclusions: Provide oral or written explanations for their findings
Make a prediction: Use test results to make predictions for further investigations
Evaluate an enquiry: 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

Researching	Nursery			Reception		
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	<p>Ask scientific questions: Ask one or two simple questions linked to a topic</p> <p>Present results: Present what they have learnt verbally or using pictures</p> <p>Interpret results: Be able to answer their questions using simple sentences</p>	<p>Ask scientific questions: Ask one or two simple questions linked to a topic</p> <p>Present results: Present what they have learnt verbally or using pictures</p> <p>Interpret results: Be able to answer their questions using simple sentences</p>	<p>Ask scientific questions: Ask a range of questions linked to a topic</p> <p>Plan an enquiry: Choose a source from a range provided</p> <p>Present results: Present what they learnt verbally or using labelled diagrams</p> <p>Interpret results: Be able to answer their questions using simple scientific language</p> <p>Evaluate an enquiry: Suggest limitations e.g. only had one book. Suggest new questions arising from the investigation.</p>	<p>Ask scientific questions: Ask a range of questions linked to a topic</p> <p>Plan an enquiry: Choose a source from a range provided</p> <p>Present results: Present what they learnt verbally or using labelled diagrams</p> <p>Interpret results: Be able to answer their questions using simple scientific language</p> <p>Evaluate an enquiry: Suggest limitations e.g. only had one book. Suggest new questions arising from the investigation.</p>	<p>Ask scientific questions: Ask a range of questions recognising that some can be answered through research and others may not</p> <p>Plan an enquiry: Choose suitable sources to use</p> <p>Present results: Present what they learnt in a range of ways e.g. different graphic organisers</p> <p>Interpret results: Be able to answer their questions using scientific evidence gained from a range of sources</p> <p>Evaluate an enquiry: Be able to talk about their degree of trust in the sources they used</p>	<p>Ask scientific questions: Ask a range of questions recognising that some can be answered through research and others may not</p> <p>Plan an enquiry: Choose suitable sources to use</p> <p>Present results: Present what they learnt in a range of ways e.g. different graphic organisers</p> <p>Interpret results: Be able to answer their questions using scientific evidence gained from a range of sources</p> <p>Evaluate an enquiry: Be able to talk about their degree of trust in the sources they used</p>