Science Curriculum

Purpose of study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims

The national curriculum for science aims to ensure that all pupils: develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Subject content

Key stage 1

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' is described separately in the programme of study, but must always be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Lower Key stage 2 – years 3 and 4

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

‘Working scientifically’ is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Upper Key stage 2 – years 5 and 6

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

‘Working and thinking scientifically’ is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read, spell and pronounce scientific vocabulary correctly.

Upperwood Academy Science Concept Coverage

Biology	Chemistry	Physics

	KS1		LKS2		UKS2	
	Cycle A	**Cycle B**	**Cycle A**	**Cycle B**	**Cycle A**	**Cycle B**
Autumn 1	Animals Including Humans	Materials	Animals Including Humans	Living Things and Their Habitats	Animals Including Humans	Forces
Autumn 2	Seasonal Changes	Materials (working scientifically)	Electricity	Forces	Animals Including Humans	Electricity
Spring 1	Living Things	Plants	Light	Materials (States of Matter)	Earth and Space	Living Things and Their Habitats
Spring 2	Living Things	Plants	Animals Including Humans	Plants	Earth and Space	Light
Summer 1	Materials (properties & changes)	Habitats	Forces	Sound	Plants	Materials (Properties and Changes)
Summer 2	Seasonal Changes	Habitats (working scientifically)	Materials (Changes)	Rocks	Evolution and Inheritance	Materials (Properties and Changes)

Working Scientifically

Purpose of study

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Aims

The national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

'Working and thinking scientifically' is described separately at the beginning of the programme of study but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content

Key Stage 1

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

Lower Key Stage 2

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

Upper Key Stage 2

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments

		KS1	LKS2	UKS2
Working Scientifically	**Framing Questions**	I ask questions about what I see. I contribute to class discussion in science. I ask a range of simple questions about what they notice. I find information from books or other printed and screen sources.	I ask relevant questions about what they notice I use a range of texts to investigate science topics. I know how to generate further questions to test results. I begin to use relevant information from text and sources.	I select the most appropriate ways to answer science questions using different types of scientific enquiry I select appropriate sources from a range of information
	Planning Enquiries	I recognise that my questions about what I notice can be answered I know how to suggest ways to answer my question. I know why I am trying to find things out. I recognise that my questions about what I notice can be answered in different ways I begin to give reasons to support my ideas I act on suggestions about how to find things out	I use different types of scientific enquires to answer my questions about what I notice I predict what might happen before I carry out any tests. I act on suggestions and put forward my own ideas about how to improve my enquiry methods	I plan different types of scientific enquiries to answer questions. I find and discuss the controlling variables to be considered I use the key factors to decide on the variables for my experiment I make predictions based on my scientific knowledge and understanding I know how to give scientific reasons, using my past knowledge, to give reasons for predictions I plan to use appropriate apparatus effectively in my scientific enquiries I make practical suggestions about how my enquiry methods can be improved

	Observing	I observe things closely I give some reasons why some things might happen. I use all my senses to observe so that I know how to try to answer questions. I describe my observations using scientific vocabulary.	I make systematic and careful observations using a range of equipment I give reasons for my observations. I use scientific vocabulary to describe my observations.	I record observations systematically I make a series of precise observations and comparisons when completing scientific tasks I repeat observations and offer explanations for any differences I encounter
	Classifying	I know how to identify things in the natural and man-made world. I know how to identify differences, similarities or changes relating to natural and man-made things.	I know how to sort animals and objects accurately according to a given criteria. I know how to use a variety of ways to classify information.	I know how to identify differences, similarities or changes that may impact upon simple scientific ideas and processes
	Measuring	I make measurements using simple equipment.	I measure length, mass and time using suitable equipment and standard units I know how to use thermometers to record standard units of temperature.	I take and record measurements with increasing accuracy and precision I repeat measurements and offer explanations for any differences I encounter
	Testing	I know how to use simple equipment to investigate. I know how to use simple equipment to carry out a range of tests.	I know how to use a variety of ways to gather information. I know how to use a variety of ways to record my findings. With help, I know how to carry out simple practical enquires, comparative and fair tests.	I select appropriate apparatus to set up further enquiries, comparative and fair tests. I experiment with a range of methods to ensure I have the correct approach to a given task. I use test results to ask further questions within a scientific enquiry.

	Gathering Observations	I know how to put information on a chart. I record my observations on screen and paper using text, tables, drawings, and labelled diagrams. I compare observations using scientific vocabulary.	I record my observations, comparisons and measurements using tables, charts, text, and labelled diagrams. I know how to present data in different ways. I know how to report my findings to others in a variety of ways.	I use appropriate scientific language and conventions to communicate both quantitative and qualitative data. I know how to select appropriate charts and tables to present my findings.
	Scientific Evidence		I use straightforward scientific evidence to answer questions or to support my findings. I know some of the work of key scientists to support my enquiry.	I know how to identify opinions and facts that have been used to support or refute scientific ideas or arguments. I identify scientific evidence that has been used to support or refute scientific ideas or arguments. I describe how experimental evidence and creative thinking have been combined to provide a scientific explanation (Jenner's work on vaccination).
	Presenting Conclusions	I know how to use a simple chart to record my findings. I know how to tell others what I have found out. I say whether what happened was what I expected.	I know how to use my findings to draw simple conclusions. I know how to make predictions from my conclusions. I refer to my observations and measurements when giving explanations. I look for patterns in my data and try to explain them.	I draw conclusions which are consistent with the evidence and relate these to scientific knowledge. I use my comparisons to inform my conclusions. I give reasons and explanations to support my conclusions. I explain casual relationships and the degree of trust in my results.

Biology

		KS1	LKS2	KS2
Plants	Type	I know what a plant is (A plant is a living organism that usually grows in a permanent site, using water for food). I know how to identify and name some common plants and trees. I know the name of some native plants to the U.K. I know the name of plants and trees found in different habitats (deciduous and evergreen). I know how to sort plants and trees into groups based upon the habitat in which they are found (deciduous and evergreen). I know that plants can grow in different places. (e.g. water, woods, etc). I know how to identify the features of plants and why these may be appealing to people (easy to grow, insects).		
	Structure	I know the basic structure of a plant (root, stem, leaf, flower/petals).	I know the different parts of a flowering plant (sepal, petal, stamen, filament, anther, pistil, stigma, and carpel). I know the function of each part of a flowering plant (sepal, petal, stamen, filament, anther, pistil, stigma, and carpel).	
	Needs	I know how to describe the basic conditions required for plants to survive (food, water, air, warmth and light). I know how to investigate what happens to a plant if they do not have water, light or a suitable temperature.	I know how to investigate what plants require for growth and life (food, water, air, warmth and light) and this varies from plant to plant. I know how the different requirements of plants may vary depending on their environment (cactus requires less water, seaweed has less direct sunlight & lives in salt water, carnivorous plants: Venus flytraps). I know how to investigate how water is transported within a plants circulatory system.	I know how plants have adapted in different ways to suit their environment (for water, food, sunlight, warmth, protection).
	Reproduction	I know how to describe the life cycle of a plant (None flowering plant: seed, germination, sprout, seedling, plant). I know the ways in which plants change over time.	I know how to describe the different stages of the life cycle of a flowering plant.(Recap of Y2) I know what pollination is. I know what seed formation is. I know how seeds are dispersed in a variety of ways.	I know how flowering plants reproduce sexually. I know how none flowering plants reproduce asexually. I know how to point out and describe the similarities between a human and plant cycle. I know how to describe the main processes, which occur at the different stages of the life cycle of a flowering plant.

		KS1	LKS2	KS2
Animals including humans	Type	I know common animals such as: fish, amphibians, reptiles, birds and mammals. I know different animals that are carnivorous, herbivorous or omnivorous.		
	Structure	I know different parts of an animal's body. I know the key features of an animal's body (bird: wings, beak. Fish: fins, gills etc).	I know some animals have skeletons and muscles. I know how skeletons and muscles support, protect and allow the body to move. I know how to name and label main bones based upon their functions (protective: spine, skull, ribs, pelvis. Other for support: femur, tarsals, etc.)	
	Needs	I know the basic needs required for animals to survive (food, water, air). I know what an animal needs to grow and survive.	I know the similarities and differences between the diets of different organisms. I know how diet can affect the health of animals. I know what nutrition is and where it comes from: different types of foods. I know sources of nutrition: carbohydrates, protein, fats, dairy, fruit & veg, oils and spreads, sugar. I know the different ways that animals obtain their food. I know producers, predators, prey, and examples of these. I know how to interpret food chains and gain information. I know how to construct different food chains and label animals with their titles (producer, primary consumer, secondary consumer, tertiary consumer).	
	Reproduction	I know why animals have offspring. I know how to match parent animals to their offspring. I know how to identify animals that give birth to live offspring and those that lay eggs.		I know how to identify and describe a life cycle for a mammal, an amphibian, an insect and a bird. I know how to compare the differences between the life cycles of a mammal, an amphibian, an insect and a bird. I know how animals reproduce.
	Humans	I know parts of the body: head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, nose and teeth. I know the five senses: feel, smell, see, taste and hear. I know which part of the body is associated with each sense (feel: every part of the body, NOT hands). I know the importance of exercise for humans. I know how different exercises effect different parts of the body. I know how to group foods into more or less healthy. I know how to group foods into types and quantities to maintain a healthy lifestyle. I know the importance of keeping myself clean.	I know what the digestive system does. I know simple functions of each part of the digestive system: mouth, teeth, tongue, oesophagus, stomach, large and small intestine, anus). I know the different types of teeth in the human body: incisors, canine, pre-molar and molar. I know the functions of different types of teeth.	I know the human life cycle: foetus, baby, infant, toddler, child, teenager, adult, elderly and death. I know ways in which the human body changes as it ages. I know the functions of the heart, lungs and circulatory system. I know the different structures within blood: red blood cells, white blood cells, plasma and platelets. I know the purpose of blood in transporting nutrients within the body. I know the ways in which diet, exercise, drugs and lifestyle can affect how the body functions. I know the impact diet, exercise, drugs and lifestyle has on the human body.

		KS1	LKS2	KS2
Living things and their habitats	Identify & compare	I know basic life processes required for plants and animals to be living (MRS NERG – movement, reproduction, sensitivity, nutrition, excretion, respiration, growth). I know how to identify living things by judging against the seven life processes (MRS NERG). I know the differences between living and non-living things. I know the differences between living things, dead things and things that have never been alive.	I use my knowledge of basic life processes (MRS NERG) to describe the differences between plants and animals (for example: animals clearly move/excrete – plants are less obvious).	I know the differences in life cycles between different classification groups.
	Habitats	I know the names of plants and animals found in different habitats (different climates and geographical locations: seashore, woodland, in the ocean, in the rainforest). I know what a microhabitat is (under stones, logs, leaves, a bush). I know how a habitat is suitable for the animals and plants that live there. I know how to describe how the conditions in a habitat affect the number of living things found there.	I know how to suggest ways in which an animal is suited to its environment. I know why different organisms are found in different habitats because of differences in environmental factors. I know how to identify ways in which an environment can change or be altered. I know how to identify why changes to an environment could be dangerous for the living things found there.	
	Adaptations	I know how living things are suited to their habitat.	I know how animals and plants in two different environments have adapted.	I know how adapting to an environment over a period may lead to evolution.
	Classification	I know how to sort living things into groups and say why I have put them in a group (living, none living (dead), never lived).	I know how to use a classification key to group living things.	I know the importance of the Linnaean system for classifying animals. I know how living things are classified into different groups I know living things are classified into groups according to observable characteristics and how they may be similar or different.

		KS1	LKS2	KS2
Evolution and inheritance	Fossils		I know that a fossil are the remains of a once living thing.	I know that fossils are formed from living things that have died. I know how fossils can provide information (type of animal, body structure) about living things from the past.
	Evolution			I know how adaptions which occurred over time may lead to evolution.
	Offspring			I know that living things produce offspring that inherit some traits from their parents. I know why offspring are not identical to their parents. I know how to interpret the phrase 'survival of the fittest' in my own words making links to my understanding of evolution.

Chemistry

		KS1	LKS2	KS2
Materials	Type & uses	I know how to identify what material an object is made from: wood, plastic, glass, metal and rock. I know how to identify a range of common materials: wood, plastic, glass, metal, water and rock. I know the names of different everyday materials: brick, paper, fabrics, elastic, foil etc. I know how to give reasons why a material may or may not be suitable for a certain purpose: wood, metal, plastic, glass, brick, rock, paper and cardboard. I know how to identify that a material can be used for more than one purpose. e.g. Metal – coins, cans, cars. I know how to identify that different materials can be used for the same purpose. E.g. Spoons – metal, plastic, wood.		I know how to use scientific vocabulary to explain why materials are used for specific purposes. I know how to discuss the scientific physical properties of these materials to explain why they are suitable or unsuitable for different purposes.
	Properties	I know how to describe materials by saying what they look like and what they feel like. I know how to identify physical properties of different materials: **soft/hard, stretchy/stiff, shiny/dull, rough/smooth, bendy/not bendy, waterproof/not waterproof, absorbent/not absorbent, opaque/transparent.** I know how to discuss the physical properties of these common materials, using my senses. I know how to describe how the physical properties of a material would make them suitable or unsuitable for a purpose.	I know how to understand the properties of different states of matter. (Solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). I know how to describe the structure of solids, liquids and gases. I know how to create a representation of the particles in solids, liquids and gases.	I have developed a wide scientific vocabulary for describing the properties of materials: hardness, solubility, transparency, conductivity (electrical and thermal) and magnetic. I describe the properties of materials using scientific vocabulary. I know how to understand the main properties of metals: lustrous, malleability, conductivity and high melting point. I use these properties to distinguish between metals and non-metals.
	Comparison	I know how to compare materials using the physical properties of them. I know how to use my knowledge of the properties of materials to sort them into groups. I know how to explain how I have grouped materials based on their physical properties. I know how to use the physical properties of materials to discuss the similarities and differences between them.	I know how to group materials according to whether they are solids, liquids or gases.	I know how to describe the difference in properties of a range of materials: hardness, solubility, transparency, conductivity (electrical and thermal) and magnetic. I know how to compare and group materials based on their properties: hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets.
	Changes	I know how to experiment with squashing, twisting, bending and stretching materials. I know how to explain how these processes change materials. I know how to use the vocabulary I have gathered on physical properties to describe how the materials change. I know how to sort materials into groups for which will or will not change. (Squashing, twisting, bending and stretching).	I know how to record changes in state when objects are heated or cooled (water – ice, water, water vapour). ***Note – avoid using heat where chemical changes occur e.g. baking or burning*** I know how to measure the temperature in degrees Celsius when changes in state occur in different materials (water, chocolate, butter, cream) I know how to research about changes in state with extreme temperatures. (E.g. iron melts/oxygen condenses) I know how to identify the part played by evaporation and condensation in the water cycle. I know how to explain how the rate of evaporation changes in water based on the temperature.	I know how to understand reversible and irreversible changes. I know how to describe how materials form into a solution. I understand that some materials will dissolve in a liquid and form a solution. I know how to investigate a range of contexts in which changes take place. I know how to describe the difference between melting and dissolving. (Melting – only one material, dissolving – two or more materials) ***Note: Pupils are not required to make quantitative measurements about conductivity and insulation at this stage.***
	Separation			I understand how a range of mixtures can be separated: evaporating, filtering and sieving. I know how to explain the processes of filtering, sieving and evaporating. I know how to describe how to recover a substance from a solution as a process. I know how to suggest how different mixtures may be separated. (liquids and different sized solids)

		KS1	LKS2	KS2
Rocks	Types		I know how to identify and name a range of rock types: granite, marble, chalk, limestone, slate, sandstone, pumice, basalt, shale. I know how to explain the difference between igneous, metamorphic and sedimentary rocks. I know how to describe the process of how fossils are formed.	
	Properties		I know how to identify the physical properties of rocks: permeable, durable, density (sinks or floats), hardness. I know how to identify if a rock has grains or crystals. I know how to suggest uses for types of rocks based on their physical properties.	
	Compare		I know how to compare different kinds of rocks based on their appearance and simple physical properties. I know how to group together different kinds of rocks based on their appearance and simple physical properties. I know how to investigate what changes occur to rocks: rubbing them together and submerging in water	
	Soil		I know how to describe the main components of soil: rock, humus (dead plants and animals), microorganisms, air and water. I know how to understand different types of soils and their properties: sandy soil, clay soil, chalky soil and peat.	

		KS1		LKS2		KS2	
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Physics

		KS1	LKS2	KS2
Forces and Magnets	Type		I know how to explain what a force is (pushes and pulls in a particular direction). I know how to identify how forces make objects move (push & pull). I know how to identify forces that require direct contact between two objects (push & pull). I know how to identify forces that do not require direct contact between two objects (magnetism).	I know how to name forces that make things begin to move, get faster or slow down: gravity, air resistance, water resistance & friction. I know how to identify examples where these forces are acting on an object (gravity, air resistance, water resistance & friction). I know how to identify examples of balanced and unbalanced forces. I know how to understand the function of levers, pulleys and gears.
	Effect		I know how to compare how different objects move on the same surface. I know how to compare how the same objects move on different surfaces.	I know how to explain how balanced and unbalanced forces may affect the movement of an object. I know how to explore how different forces effect moving objects (gravity, air resistance, water resistance & friction). I know how to explain the effects of these forces. I know how to explain how levers, pulleys and gears allow a smaller force to have a greater effect.
	Magnets		I know that magnets have two poles. I understand through investigation that two magnets can attract or repel each other. I know how to explore the behaviour of different strengths and types of magnets such as bar, ring, button & horseshoe. I know how to investigate and find out which materials are magnetic (metallic and none metallic). I know how to investigate whether all metals are magnetic (different metals, which are/aren't magnetic). I know how to identify how the properties of magnets make them useful in everyday items (strengths/types of magnets – magnets in a fridge door).	

		KS1	LKS2	KS2
Light	Function		I know how to explain that light is need to be able to see. I know how to explain that darkness is the total absence of light. I know how to identify different light sources: fire, bulb, sun.	I know how to explore how different light sources and conditions affect our ability to see (testing quality of light sources, altering darkness and using different materials).
	Seeing		I understand that light from the sun can be dangerous. I know how to identify ways to protect eyes from the sun. I understand that reflection is a process where light hits a surface and bounces back into our eyes (all objects reflect light In order for us to see them, but reflective objects reflect light well, i.e. a mirror).	I know how to explain that objects are seen because they give out or reflect light into the eye. I know how to explain how different colours can be seen.
	Travelling		I understand that light travels in rays. I know how to investigate how light behaves (using a mirror to show light reflecting). I know how to recognise that shadows are formed when light is blocked from an opaque object. I know how to explore patterns in the way that shadows change (i.e. distance of light source, type of material: opaque, translucent, and transparent).	I understand that light travels in straight lines. I know how to investigate the angles of incidence and reflection. I know how to investigate how refraction changes the direction in which light travels. I know how to investigate how a prism changes a ray of light. I know how to explain why shadows have the same shape as the object that casts them.

		KS1	LKS2	KS2
Electricity	Uses		I understand what electricity is (a form of energy resulting from the existence of electrical current). I understand that some items require electricity to work and function. I know how to group items, which use an alternating current (mains electricity) or direct current (a battery/cell). I know how to identify common conductors and insulators. I understand the uses of different conductors and insulators.	
	Making circuits		I know how to identify each component of an electrical circuit (cells, wires, bulbs, buzzers & switches). I know how to construct a simple series circuit. I know how to draw a pictorial representation of a circuit (NOT using symbols – these to be taught in Y6). I know how to explain how a switch works and why they are needed (to open and close a circuit and stop the electrical current).	I know how to explain what voltage means (voltage is a force that makes electricity move through a wire). I know how to explain what current means (current is the flow of electric charge, a current flows through a circuit when a voltage is present). I know how to recognise the symbols that represent the parts of a circuit (bulb, buzzer, motor, cell, wire, lamp, open switch, closed switch). I know how to use symbols when drawing a diagram of a circuit. **Note: children are expected to learn only about series circuits, not parallel circuits.**
	Investigating circuits		I know how to investigate the way that bulbs work in different circuits (exploring the brightness of bulbs). I know how to identify whether a bulb will light or not based on the circuit. I know how to give reasons why a bulb does not light up in an electrical circuit.	I understand that the brightness of a bulb or volume of a buzzer is related to the voltage of cells used in that circuit. I know how to compare and explain variations in how components function (brightness of bulbs, loudness of buzzer, on/off switches).

		KS1	LKS2	KS2
Seasonal Changes	Four seasons	I know how to identify each of the four seasons. I know how to make observations about each season. I know how to identify the changes that happen in each of the four seasons. I know how to identify the differences between the four seasons. I know how to identify how the length of the day varies during different seasons.		
	Weather	I know how to identify different types of weather (relating to the UK). I know how to make observations about the weather in each season. I know how to describe the weather in each season. I know how to compare the weather in different seasons.		

		KS1	LKS2	KS2
Sound	Function		I understand that sounds are made through vibrations. I know how to identify different sources of sound.	
	Hearing		I know how to recognise that sounds travel from a source to an ear. I know how to investigate ways that different mediums absorb sound. I know how to investigate patterns between the pitch of a sound and features of the object that produced it (different types of instruments, water in bottles, ruler flicked on table). I know how to investigate patterns between the volume of a sound and the strength of the vibrations that produced it.	
	Travelling		I understand that sound travels in waves. I understand that the amplitude of waves effects the volume (taller the waves, louder the sound). I understand that the speed of vibrations effect the pitch (closer the waves, higher the pitch). I know how to explain how sound can travel through solids, liquids and gasses but not a vacuum (sound energy travels from particle to particle).	

		KS1	LKS2	KS2
Earth and Space	Solar System			I know how to name the eight planets that make up our solar system (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus & Neptune – in 2006, Pluto was reclassified as a Dwarf planet). I know how to order and name the Sun and planets in our solar system. I know how to explain some of the key features of planets in our solar system (temperature, size, diameter, orbital period) I know how to investigate the difference between the geocentric model and the heliocentric model of the solar system.
	Sun, Earth & Moon			I understand the difference between a star, planet and celestial body. I know how to explain that the Sun, Earth and Moon are spherical. I know how to use scientific evidence to support the argument that the Sun, Earth & Moon are all spherical. I know how to describe the movement of the Moon relative to the earth (investigate the phases of the moon).
	Day & Night			I know how to explain how day and night relate to the rotation of the Earth. I know how to explain how the rotation of the Earth affects the length of a year. I know how to investigate night and day in different parts of the Earth (investigate longitude and latitude – day and night at different times and durations).