Y1 Science

Working scientifically	Living things (Biology)		Materials (Chemistry)		Science of matter (Physics)	
	Plants, animals including humans, habitats, evolution and inheritance Animals, ourselves, growing plants Visits: Animal Man visitor, London Zoo, Kew Gardens, Seasonal walks to Vine Park throughout the year (observing changes etc.)		Materials and their properties, rocks, states of matter Materials		Forces, magnets, seasonal changes, electricity, light, earth and space and sound Light, seasonal change, sound and hearing	
Key skills To be able to ask simple questions and recognising that they can be answered in different ways. To be able to observe closely, using simple equipment. To be able to perform simple tests. To be able to identify and classify. To be able to gather and record data to help in answering questions. To be able to use their observations and ideas to suggest answers to questions. **Trips and visits** Animal Man visitor. Visit to London Zoo. Trip to Kew Gardens. Seasonal walks to Vine Park throughout the year (observing changes etc).	**Key knowledge** **Topic: Animals** To know animals can be grouped according to their similarities and differences. To know animals can be divided into five main groups: mammal, reptiles, birds, amphibians and fish. To know herbivores are animals that only eat plants. To know carnivores are animals that only eat other animals. To know omnivores are animals that eat both plants and animals. To know mammals are warm-blooded animals with hair or fur and can produce milk to feed their young. To know birds are warm-blooded animals with feathers, wings and beaks. They lay eggs. To know reptiles are animals that have dry scaly skin and are cold-blooded. To know amphibians are animals that live both in water and on land. They have smooth skin. To know fish are animals that live in water and breathe through gills. They have scales. **Topic: Ourselves** To know humans have five senses – taste, hearing, smell, sight and touch. To know taste is associated with tongue and mouth. To know hearing is associated with ears. To know smell is associated with the nose. To know sight is associated with eyes. To know the sense of touch is located all over the body, the skin being one large sensory organ. To know how to name the private parts of the body. **Topic: Growing Plants** To know the main parts of a plant are roots, stems, leaves and flowers. To know roots anchor the plant in the soil and absorb water and minerals. To know stems keep the plant upright by supporting the leaves, flowers and fruit. To know leaves make food for the plant. To know flowers are the reproductive organs of the plant.	**Key skills** **Topic: Animals** To be able to identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. To be able to identify and name a variety of common animals that are carnivores, herbivores and omnivores. To be able to describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). **Topic: Ourselves** To be able to identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. To be able to fair test to describe and compare a variety of different smells, identifying which are the most and least liked by the class. **Topic: Growing Plants** To be able to identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. To be able to identify and describe the basic structure of a variety of common flowering plants, including trees. To be able to observe closely and draw and label plants.	**Key knowledge** **Topic: Materials** To know a material may be rough or smooth, bumpy or uneven, waterproof or not waterproof, absorbent or not absorbent, hard or soft, opaque or transparent. To know materials are natural or they are made. To know natural materials are changed by people into lots of useful things. To know that people mix natural materials to make new ones.	**Key skills** **Topic: Materials** To be able to distinguish between an object and the material from which it is made. To be able to identify and name a variety of everyday materials, including wood, plastic, glass, brick, metal, water, and rock. To be able to describe the simple physical properties of a variety of everyday materials. To be able to compare and group together a variety of everyday materials based on their simple physical properties. To be able to complete a fair test to see which materials are waterproof and which kind of paper is best for writing on. To be able to observational drawings of fabric using simple equipment.	**Key knowledge** **Topic: Light** To know darkness is the absence of light. To know a light source is a device that gives out light. To know a reflector is a device that reflects light. To know transparent materials let light pass through them in straight lines so that you can see clearly through. To know a shadow is the dark shape made when something blocks light from a light source. **Topic: Light and Dark and Seasonal Change** To know there are four seasons called spring, summer, autumn and winter which are marked by different weather. To know weather is the day to day conditions of a place. To know temperature is a degree of how hot or cold something is. **Topic: Sound and Hearing** To know sound is a type of energy. To know sounds are created by vibrations. To know the louder the sound the bigger the vibration. To know vibration is a quick movement back and forth. To know sound waves are vibrations travelling from a sound source. To know volume is the loudness of a sound. To know pitch is how high or low a sound is. To know the eardrum is a part of the ear which is a thin, tough layer of tissue that is stretched out like a drum skin. To know sound waves make the eardrum vibrate.	**Key skills** **Topic: Light** To be able to identify different light sources, including the Sun. To be able to fair test to see which objects are light sources and which are not. To be able to fair test to investigate shadows. **Topic: Light and Dark and Seasonal Change** To be able to observe changes across the four seasons. To be able to observe and describe weather associated with the seasons and how day length varies. **Topic: Sound and Hearing** To be able to understand that there are many kinds of sound and sources of sound. To be able to understand that sounds travel away from sources, getting fainter as they do so. To be able to describe that sounds are heard when they enter the ear. To be able to fair test to investigate 'What happens to a sound as we move further away?'

		To know deciduous plants lose their leaves in the autumn. To know evergreen plants stay leafy all year around. To know the main parts of the tree are the trunk, roots, leaves and sometimes fruit and blossom.					
		Key vocabulary (tier 2) animals arms body environment feet flower fruit garden plant group hands hearing leaves legs petal private parts seed sight smell soft characteristics stem taste touch weeds wild plant	**Key vocabulary (tier 3)** amphibians bitter bulb carnivores deciduous evergreen fish herbivores mammals nipples omnivores penis reptiles root sour sweet testicles vagina vulva	**Key vocabulary (tier 2)** brick compare contrast different fair test glass hard material metal object plastic properties similar soft wood	**Key vocabulary (tier 3)** absorbent fabric manmade material natural material opaque transparent waterproof	**Key vocabulary (tier 2)** autumn bigger darkness drum explore fair test high investigate light loud(er) low material observe predict quiet(er) season shadow smaller sound spring summer temperature volume weather winter	**Key vocabulary (tier 3)** absence climate eardrum energy faint forecast light source opaque pitch reflection reflector sound waves tissue transparent materials vibration

Y2 Science

Working scientifically	Living things (Biology)		Materials (Chemistry)		Science of matter (Physics)	
	Plants, animals including humans, habitats, evolution and inheritance **Animals, ourselves, growing plants** **Visits: Kew Gardens to look at habitats, Forest school to look at microhabitats, KS2 pond / Creepers Playground to collect data on different animals/insects**		**Materials and their properties, rocks, states of matter** **Materials**		**Forces, magnets, seasonal changes, electricity, light, earth and space and sound** **Light, seasonal change, sound and hearing** **Visits: electricity focus day, forces focus day**	
Key skills To be able to ask simple questions and recognising that they can be answered in different ways. To be able to observe closely, using simple equipment. To be able to perform simple tests. To be able to identify and classify. To be able to gather and record data to help in answering questions. To be able to use their observations and ideas to suggest answers to questions. **Trips and visits** Kew Gardens to look at habitats. Visit to forest school to look at microhabitats. Visit to the KS2 pond / Creepers Playground to collect data on different animals/insects. Electricity focus day. Forces focus day.	**Key knowledge** **Topic: Animals and humans** To know animals obtain their food from plants and other animals. To know animals and humans have offspring which grow into adults. To know some animals have offspring that look like them, some have offspring that look very different, such as a frog and a tadpole. To know stages of human development: baby, toddler, child, teenager, adult, elderly person. To know humans and animals have basic needs: water, food, air and shelter to survive. To know humans need exercise, sleep, good nutrition and good hygiene to maintain good health. To know Florence Nightingale helped stop the spread of germs in Crimea. To know to be hygienic: wash hair, brush teeth, change underwear, shower and wash hands. To know vertebrates are animals with a backbone. To know invertebrates are animals without a backbone. **Topic: Living Things and their habitats** To understand how living things have adapted to their habitats. To know how to identify key adaptations and how they are important. To know mmost living things live in habitats to which they are suited. To know habitats provide the basic needs for different kinds of animals and plants and they depend on each other. **Topic: Plants** To know seeds and bulbs need a suitable temperature, air and water to germinate. To know they can germinate without light. To know plants usually need suitable temperature, air, water, light, space and soil to grow and remain healthy. To know a seed is a small part produced by a plant from which a new plant grows. To know a bulb is a plant bud that grows underground.	**Key skills** **Topic: Animals and humans** To be able to find out about and describe the basic needs of animals, including humans, for survival (water, food and air. To be able to describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene. To know when we exercise, our heart beats faster. Sometimes we become out of breath and our muscles ache. To know babies, toddlers and children are smaller and need more care. To know as we get older, we grow, our bodies change. To know as we get older, we look after ourselves independently and sometimes look after others. **Topic: Living Things and their habitats** To be able to explore and compare the differences between things that are living, dead, and things that have never been alive. To be able to identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. To be able to identify and name a variety of plants and animals in their habitats, including microhabitats. To be able to describe how animals, obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. **Topic: Growing Plants** To be able to observe and describe how seeds and bulbs grow into mature plants. To be able to find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. To be able to set up a fair test to show how plants grow.	**Key knowledge** **Topic Materials** To know everything is made from materials. To know all materials have properties/characteristics. To know objects are made from materials that suit their purpose. Some materials can be changed by squashing, bending, twisting and stretching.	**Key skills** **Topic Materials** To be able to identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. To be able to find out how the shapes of solid objects made from some materials can be changed. To be able to set up a fair test to investigate different materials and their properties.	**Key knowledge** **Topic Electricity - focus day** To know electricity powers devices (iPads, tablets, mobile phones) and appliances (kettle, toaster, washing machine). To know electricity can come from power stations, wind turbines, solar panels, water powers and batteries. To know electricity can only flow when a circuit is complete. Some items use batteries, some use mains power and some use both. To know electricity can create heat, light, movement and sound. **Topic: forces – focus day** To know items move by forces. To know difference between pushing or pulling. To know the amount of energy one exerts affects the amount of movement that will occur. To know friction is two surfaces rubbing against each other.	**Key skills** **Topic Electricity - focus day** To be able to sort devices that use mains power and batteries. To be able to be able to make a simple electrical circuit. To be able to draw an electrical circuit. To be able to understand how to use electricity safely. **Topic: forces – focus day** To be able to exert a pulling and pushing force. To be able to explain how a pulling or pushing force can make us move. To be able to explain how a pushing or pulling force can make something else move. To be able to understand the amount of energy exerted will impact the amount something moves. To be able to understand what friction is and how it affects movement.

		To know a bulb creates a new plant each year. To know a seed is a small part produced by a plant from which a new plant grows. To know a bulb is a plant bud that grows underground. To know a bulb creates a new plant each year. **Key vocabulary (tier 2)** adult air animals child dead diet eggs flower food grow health humans leaves light living petal plants seed soil stem temperature water	**Key vocabulary (tier 3)** adapting bacteria bulb carbohydrates dairy elderly food chains germination germs habitat hygiene life-cycle living things microhabitat nutrition offspring organisms predator prey protein pulse roots seed seed coat seedling shelter stem survival teenager toddler	**Key vocabulary (tier 2)** flexible hard light material opaque properties rigid rough smooth soft squash stretch twist	**Key vocabulary (tier 3)** absorbent opaque properties solar power transparent waterproof	**Key vocabulary (tier 2)** bend difference electricity energy flexible hard light material opaque properties pull push	**Key vocabulary (tier 3)** absorbent batteries circuit device electric appliance and device exert force friction movement solar power wind turbine

Y3 Science

Working Scientifically

Key skills
To be able to ask relevant questions and use different types of scientific enquiries to answer them.

To be able to set up simple practical enquiries, comparative and fair tests.

To be able to make systematic and careful observations and, where appropriate, take accurate measurements using standard units, use a range of equipment, including thermometers and data loggers.

To be able to gather, record, classify and present data in a variety of ways to help in answering questions.

To be able to record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.

To be able to report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

To be able to use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

To be able to identify differences, similarities or changes related to simple scientific ideas and processes.

To be able to use straightforward scientific evidence to answer questions or to support their findings.

Trips and visits
Gardening club linked to plants.

Trip to Richmond Park linked to plants and habitats.

Living things (Biology)

Plants, animals including humans, habitats, evolution and inheritance
Animals, ourselves, growing plants
Visits: Gardening club linked to plants, Richmond Park linked to plants and habitats

Key knowledge
Topic: Living Things and their habitats
To know animals can be grouped based upon their characteristics.

To know what vertebrates and invertebrates are.

To know what a food chain is and use one.

To know about the work of David Attenborough.

Topic: Plants
To know that the stem transports water to the plant and holds it up straight.

To know that the roots absorb water and nutrients for the plant and anchor it to the ground.

To know that the flower attracts pollinators for reproduction.

To know that the leaves absorb sunlight for photosynthesis.

To know what a plant needs to live and grow: air, light, water, space and nutrients.

To know that Marianne North was a biologist and botanical artist who studied features of various plants.

Key skills
Topic: Living Things and their habitats
To be able to recognise that living things can be grouped in a variety of ways.

To be able to explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.

To be able to create a scientific diagram of an invertebrate.

To be able to recognise that environments can change and that this can sometimes pose dangers to living things.

To be able to construct and interpret a variety of food chains, identifying producers, predators and prey.

Topic: Growing Plants
To be able to explore the requirements of plants for life by setting up a fair test with different variables and a control.

To be able to investigate the way in which water is transported within plants.

To be able to research using secondary sources and observation; identifying and classifying; comparative and fair testing; carrying out a survey and presenting data in a bar chart; scientific enquiry.

Key vocabulary (tier 2)
absorb, anchor, attract, characteristics, classify, compare, construct, data, diagram, enquiry, environment, explore, features, flower, group, identify, interpret, investigate, key, leaf, predict, recognise, research, result, root, stem, straight, survey, test, transport, variety

Key vocabulary (tier 3)
bar chart, biologist, consumer, control, David Attenborough, dispersal, ecosystem, environment, fair test, food chain, germination, habitat, interdependence, invertebrate, Marianne North, nutrients, organism, pollinator, predator, prey, primary producer, producer, reproduce, stamen, stigma, transportation, variables, vertebrate

Materials (Chemistry)

Materials and their properties, rocks, states of matter
Rocks and soils

Key knowledge
Topic: Rocks and Soils
Key knowledge
To know that soil is made up of tiny particles of rock, dead plants, dead animals, air and water.

To know that there are three types of rocks: igneous, sedimentary and metamorphic.

To understand that fossils are formed when things that have lived are trapped within rock.

To know that there are different types of soils: sand, clay and loam.

To know that sand soil has large particles and is pale coloured. It is permeable.

To know that clay soil is usually sticky and has small particles. It is impermeable.

To know that loam soil is made from decayed plants and is dark, crumbly and rich in nutrients. It is permeable and is the best to use for plants.

To know that Mary Anning was a famous fossil hunter.

To know that soil is made up of different layers (bedrock, weathered rocks, subsoil, top soil and humus).

Key skills
Topic: Rocks and Soils
To be able to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.

To be able to explore the hardness of slate, granite and chalk.

To be able to predict the porosity and permeability of different rocks (granite, slate or chalk), investigate and draw a hypothesis based on the results.

To be able to observe that soils are made from rocks and organic matter.

To be able to compare and group different kinds of soil.

To be able to test the permeability of different soils.

Key vocabulary (tier 2)
appearance, compare, describe, explain, feature, observe, physical, properties, rock, soil, test

Key vocabulary (tier 3)
bedrock, clay, crystal, fossil, granite, hummus, hypothesis, igneous rock, impermeable, limestone, loam, Mary Anning, matter, metamorphic, rock, organic, permeability, permeable, porosity, porous, sedimentary rock, slate, subsoil, weathered rock

Science of matter (Physics)

Forces, magnets, seasonal changes, electricity, light, earth and space and sound
Light and forces

Key knowledge
Topic: Light
To know how to recognise that they need light in order to see things and that dark is the absence of light.

To know light comes from different sources: a primary and secondary source.

To know light travels in a straight line.

To understand that a primary light source is an object which produces its own light. For example: fire, light bulbs, the sun, stars and electricity.

To understand that a secondary light source is an object which reflects light from a primary light source. It doesn't produce it's own light. For example: the moon, mirrors, glass, motorway signs, metal and water.

To know that a reflection is an image created on a (usually flat and shiny) surface e.g. a window pane, water, mirror.

To understand how and why the size of the shadows change.

To know that light from the sun can be dangerous and that we can protect our eyes and skin from it.

To know that shadows are formed when the light from a light source is blocked by an opaque object.

Topic: Forces
To know that a force is a push, pull or twist that causes an object to move or change shape.

To know that magnets are mostly made from iron.

To know that magnets have two poles, the north pole and the south pole.

To know that magnetic field lines were first examined by Michael Faraday and later by James Clerk Maxwell.

Key skills Topic: Light
To be able to notice that light is reflected from surfaces and design a fair test to investigate reflection.

To be able to predict whether materials are good or poor reflectors.

To be able to use of a data-logger to measure light in lux.

To be able to recording findings in a bar chart, observe the size of shadows change over time.

To be able to draw accurate conclusions after investigating.

To be able to accurately label a diagram to show the direction light is travelling.

To be able to find patterns in the way that the size of shadows change.

Topic: Forces
To be able to notice that magnetic forces can act at a distance.

To be able to observe how magnets attract or repel each other and attract some materials and not others.

To be able to compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.

To be able to describe magnets as having two poles.

To be able to predict whether two magnets will attract or repel each other, depending on which poles are facing.

Key vocabulary (tier 2)
absence, block, compare, conclude, describe, diagram, distance, explain, force, identify, investigate, label, magnet, magnetic, material, measure, object, observe, pattern, predict, protect, record, reflection, shadow, source, straight, surface

Key vocabulary (tier 3)
attract, cobalt, data logger, gravity, iron, iron filings, James Clerk Maxwell, magnetic field, Michael Faraday, Nickel, north, opaque, pole, primary source, repel, secondary source, south, steel, translucent, transparent

Y4 Science	Working scientifically	Living things (Biology)		Materials (Chemistry)		Science of matter (Physics)	
		Plants, animals including humans, habitats, evolution and inheritance Animals including humans Visits: Teddington Lock (investigating water conditions)		Materials and their properties, rocks, states of matter States of matter Visits: Teddington Lock (investigating water conditions)		Forces, magnets, seasonal changes, electricity, light, earth and space and sound Electricity and forces	
	Key skills To be able to ask relevant questions and using different types of scientific enquiries to answer them. To be able to set up simple practical enquiries, comparative and fair tests. To be able to make systematic and careful observations and, where appropriate, take accurate measurements using standard units, use a range of equipment, including thermometers and data loggers. To be able to gather, record, classify and present data in a variety of ways to help in answering questions. To be able to record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. To be able to report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. To be able to use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. To be able to identify differences, similarities or changes related to simple scientific ideas and processes. To be able to use straightforward scientific evidence to answer questions or to support their findings. **Trips and Visits** Trip to Teddington Lock (investigating water conditions).	**Key knowledge** **Topic: Animals including humans** To know animals, including humans, need the right types and amount of nutrition. They cannot make their own food; they get nutrition from what they eat. To know our body needs food to provide it with the right energy, vitamins and minerals. To know we need to have a balanced diet. To know the digestive system acts in stages to digest our food. Each stage is important and prepares the food for the next stage. To know the first set of teeth, known as 'baby teeth', slowly grow. To know there are twenty baby teeth in total. To know when our adult teeth grow in, we have a total of thirty-two teeth. To know humans have four different types of teeth in our mouths: incisors, canines, premolars and molars. It is important to have good dental hygiene. To know the type of teeth an organism has helps us to identify whether it is a carnivore, herbivore or omnivore. To know humans and some other animals have skeletons and muscles for support, protection and movement. To know humans and some other animals have an internal skeleton made of bone. These animals all have a backbone (spine) made up of bones called vertebrae. To know these animals are called vertebrates. Mammals, fish, birds and reptiles are all vertebrates. To know insects have an external skeleton (a hard outer covering) known as an exoskeleton. The skeleton provides support (maintains the animal's shape), helps with movement and offers protection. To know the human skeleton (and that of most other vertebrates) contains a skull to protect the brain, ribs to protect the heart and lungs, and the spine to protect the spinal cord. To know about the work of Pierre Fauchard (dentistry), Jamie Oliver (nutrition), William Beaumont, (digestion), Wilhelm Conrad Rontgen (x-ray) and Marie Curie (radiation).	**Key skills** **Topic: Animals including humans** To be able to identify the different types of teeth in humans and their simple functions. To be able to describe the simple functions of the basic parts of the digestive system in humans. To be able to identify that humans and some other animals have skeletons and muscles for support, protection and movement.	**Key knowledge** **Topic: States of matter** To know materials can be classified as either a solid, liquid or gas. To know changes of state occur as a result of heating or cooling. To know some materials will dissolve in liquid to form a solution. To know when a solid dissolves in a liquid, it means it has broken down into pieces. To know some solids dissolve while others do not. To know when a solid dissolves in a liquid, a solution is created. To know solids dissolve at different rates. To know substances that dissolve in a liquid are known as soluble substances and those that do not dissolve in a liquid are known as insoluble. To know about the work of Archimedes, Robert Boyle and Marie Curie.	**Key skills** **Topic: States of matter** To be able to compare and group materials together, according to whether they are solids, liquids or gases. To be able to describe how to recover a substance from a solution. To be able to observe that some materials change state when they are heated or cooled and measure or research the temperature at which this happens in degrees Celsius (°C). To be able to compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. To be able to use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. To be able to give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.	**Key knowledge** **Topic: Electricity** To know how to use recognized symbols when representing a simple circuit in a diagram. To know how to recognize that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. To know different symbols when representing a simple circuit in a diagram. To know the brightness of a lamp, the volume of a buzzer or power of a motor is associated with the number and voltage of cells used in the circuit. To know how to recognize some common conductors and insulators, and associate metals with being good conductors. To understand that electricity is a form of energy. To know that electricity gives us light, sound, heat and movement. To know about the work of Lewis Howard Latimer, Thomas Edison and Michael Faraday. **Topic: Forces** To know how to explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. To know forces are at work on everyday things all the time. To know everything that changes speed, stops, starts and changes direction has forces acting on it. To know a force is a result of a push or a pull. To know gravity is an example of a pulling force – a force that pulls objects towards the center of the Earth. To know force is measured in Newtons, named after Sir Isaac Newton, a prominent scientist in this field. To know levers, pulleys and gears are simple machines, or mechanisms. To know there are two types of forces – those that work at distance (**non-contact**) and those that are in **contact**. To know g**ravity** and **magnetism** work at a distance, whereas **friction, air resistance** and **water resistance** work in contact. To know if an object is stationary or moving at a **constant speed**, then the forces acting on it are **balanced**.	**Key skills** **Topic: Electricity** To be able to compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. To be able to set up fair tests to investigate different variables in a circuit. To be able to problem solve different circuits. To be able to make predictions about what components are needed for a circuit. To be able to formulate questions to further understanding about electricity and how it works. **Topic: Forces** To be able to identify the effects of air resistance, water resistance and friction, that act between moving surfaces. To be able to recognize that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. To be able to investigate using force meters to measure force.

						To know **unbalanced forces** cause changes to movement (start, stop, speed up, slow down and changes of direction). To know about the work of Archimedes, Sir Isaac Newton and Maggie Aderin-Pocock.	
		Key vocabulary (tier 2) animal diet fats food fruits humans sugars teeth tooth vegetables	**Key vocabulary (tier 3)** anus balanced diet canine carbohydrates cementum dairy dentin digestive system enamel endoskeleton exoskeleton food groups hydrostatic skeleton incisor invertebrate large intestine molar nutrition oesophagus patella plaque premolar pulp ribcage small intestine stomach tooth decay vegetables vertebrae vertebrate wisdom teeth	**Key vocabulary (tier 2)** boiling cooling freeze gas hardness heating liquid materials melting result solid	**Key vocabulary (tier 3)** dissolve evaporation filter insoluble Melita Bentz mixture particle saturated sieve solidifying soluble solution	**Key vocabulary (tier 2)** break brightness contact diagram electricity force heat light measure movement non-contact pull push sound symbols	**Key vocabulary (tier 3)** air/water resistance balanced force battery/cell Benjamin franklin bulb buoyancy buzzer circuit conductor friction gravity incandescent insulator Sir Isaac Newton lever Maggie Aderin-Pocock magnetism mechanism Michael Faraday motor newton Nikola Tesla parallel pulley series streamlined switch Thomas Edison unbalanced force

Y5 Science

Working scientifically	Living things (Biology)		Materials (Chemistry)		Science of matter (Physics)	
	Plants, animals including humans, habitats, evolution and inheritance **Lifecycles, Heart and health** **Visits: Kew Gardens–Summer term–pollination and fertilisation/Marianne North workshop**		**Materials and their properties, rocks, states of matter** **Materials**		**Forces, magnets, seasonal changes, electricity, light, earth and space and sound** **Earth and space, sound** **Visits: Royal Observatory workshops–Spring term linked to Earth, Sun and Moon–two online**	
Key skills To be able to plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. To be able to take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. To be able to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. To be able to use test results to make predictions to set up further comparative and fair tests. To be able to report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. To be able to identify scientific evidence that has been used to support or refute ideas or arguments. **Trips/Workshops** Royal Observatory workshops–Spring term linked to Earth, Sun and Moon–two online. Kew Gardens–Summer term–pollination and fertilisation/Marianne North workshop.	**Key knowledge** **Topic: Life cycles** To know animal life cycles: a life cycle is made up of a series of developmental changes that an organism goes through, as they are born, grow, develop to adulthood, reproduce, reach old age and die. To know humans go through many changes as we develop to old age. The stages of the life cycle and length of that cycle vary, depending on the type of animal. To know mammals give birth to live young. To know amphibians spend part of their life in water and part of their life on land. To know insect life cycles vary, but most insects hatch from eggs. To know birds lay eggs that have hard shells and hatch out after incubation. To know plant life cycles include sexual reproduction in flowering plants, which involves pollination, seed formation and seed dispersal. To know the female part of a flower consists of the carpels, where the seeds are formed. It has three parts: the stigma, the style, and the ovary. To know the male parts of the flower are the stamens, which produce pollen. Each stamen has an anther and a filament. To know the anther contains the pollen and the filament supports the anther. To know Marianne North (1830–1890) travelled widely and contributed to our understanding of botany. **Topic: Heart and health** To know the main parts of the circulatory system are the heart, blood vessels (arteries, veins and capillaries) and blood. To know blood transports gases, nutrients, water and waste products around the body. To know the health of humans can be adversely affected by; poor diet; exposure to disease-causing micro-organisms: exposure to harmful substances (alcohol, tobacco, drugs and solvents); lack of exercise, rest and sleep; stress. To know regular exercise strengthens muscles including the heart; increases the amount of oxygen around the body; helps you sleep more easily; strengthens bones; releases brain chemicals which help you feel calm and relaxed. To know exercise raises heart rate. To know a healthy diet involves eating the right types of nutrients in the right amount.	**Key skills** **Topic: Life cycles** To be able to ask questions. To be able to label a scientific diagram of a flower. To be able to communicate information on life cycles through drawing diagrams. To be able to recognise patterns in data on life cycles of humans and other mammals, using a scatter graph. To be able to identify changes in puberty. **Topic: Heart and health** To be able to ask questions. To be able to communicate information on circulatory system using labelled diagrams. To be able to set up a comparative test, observe, measure and record data on a graph. Interpret results.	**Key knowledge** **Topic: Materials** To know there are three states of matter: solids, liquids and gases. To know in a solid, all the particles are locked together. To know in liquids, particles can slide past each other. To know in gases, particles are free to move about. To know when something melts, freezes or evaporates, the only change is in the way the particles of the substance are held together. To know changes of state occur as a result of heating or cooling. They affect the properties of the substance but not its chemical make-up. Changes of state are reversible. To know boiling is the process where bubbles form inside a heated liquid. The bubbles are full of the vapour (gas) from the liquid. To know evaporation–particles of liquid escape into the air. Evaporation needs a source of energy. To know different factors affect the rate of evaporation, including temperature. To know condensation–a gas changes state into a liquid. To know condensation occurs on cold surfaces, because they take the heat from the air. To know water in our atmosphere moves in the water cycle: heat from the sun evaporates water, which rises, condenses in the cool air to form clouds and falls back down to earth. To know Stephanie Kwolek (1923–2014) invented Kevlar, an extremely strong, heat-resistant synthetic fibre.	**Key skills** **Topic: Materials** To be able to ask questions. To be able to identify, group and classify substances into solids, liquids and gases. To be able to communicate changes of state using a diagram. To be able to plan, carry out and evaluate a fair test of how surface area affects the rate of evaporation of water. To be able to recognise and control variables, and take accurate measurements. To be able to present results in a line graph.	**Key knowledge** **Topic: Earth and Space** To know the Sun is a star. Its burning gases produce sunlight. The Sun's gravity holds the planets in orbits around it. To know we live on a small planet, the third of eight that orbits around the Sun. Together, the Sun and planets make up our solar system. To know the Sun, Earth and Moon are approximately spherical bodies. The Earth spins through one complete turn in a day. This produces sunrise, daylight, sunset and night and causes the apparent movement of the sun across the sky. To know the Earth goes around the Sun once a year. This produces the seasons – spring, summer, autumn and winter. To know the seasons are caused by the way the Earth is tilted. The northern hemisphere has summer when it is tilted towards the Sun. The northern hemisphere has winter when it is tilted away from the Sun. To know the Moon takes just over 28 days to go around, or orbit, the Earth. The way we see the Moon depends upon how we see the light it reflects from the Sun. To know the Earth is about 4 times as wide as the Moon. The Sun is about 100 times as wide as the Earth. To know Katherine Johnson, Claudius Ptolemy, Nicolaus Copernicus and Galileo Galilei all contributed to our modern understanding of space. **Topic: Sound** To know sounds are caused by a material vibrating. To know for sounds to travel they require a medium to pass through, which can be a solid, liquid or gas. To know we hear sounds because the vibrations produced by the source pass through the air. When they reach our ears, they cause our eardrums to vibrate, stimulating the nerve endings in the ear so we hear the sound. To know the pitch of a sound can be high or low. To know the speed of the vibrations is known as their frequency. The higher the frequency, the higher the pitch. Generally, larger objects will vibrate more slowly and produce lower notes. To know sounds can also be loud or quiet–the volume of the sound. The loudness of a sound depends on how strong the vibrations are. To know the size of vibrations is called the amplitude. The higher the amplitude, the	**Key skills** **Topic: Earth and Space** To be able to ask questions. To be able to model the movement of the Earth and moon with a 2D model and with drama. To be able to identify scientific evidence used to support or refute the idea that the Earth is a sphere. To be able to observe the phases of the moon over time. To be able to record seasonal variations. To be able to record data in a table. To be able to interpret data in a table (sunrise and sunset times). To be able to research the contributions of historical scientists to our current understanding. To be able to seek patterns in the seasons, the phases of the moon, sunrise and sunset times. To be able to formulate questions to further understanding. **Topic: Sound** To be able to find patterns between the volume of a sound and the strength of the vibrations that produced it. To be able to record observations of volume and pitch on a sound map. To be able to predict volume of an instrument. To be able to measure volume of instruments using a data recorder. To be able to interpret and communicate results. To be able to find patterns between the pitch of a sound and features of the object that produced it. To be able to plan and carry out a comparative test to see which material best muffles sound. To be able to record and interpret results. To be able to evaluate the test.

		To know Marie Maynard Daly 1921–2003 discovered the link between heart health and cholesterol.				stronger the vibrations, the louder the sound. This is measured in decibels (dB). To know as the vibrations pass through the air away from the source, the vibrations become weaker and the volume decreases. To know Alexander Bell (1847–1922) invented the telephone.	
		Key vocabulary (tier 2) adulthood amphibian animal blood change develop development diet disease drugs exposure flower fruit hatch heart insect life cycle mammal plant regular series stage strengthen substance transport waste	**Key vocabulary (tier 3)** adversely anther aorta artery atrium blood vessels capillary carpel cholesterol circulation fertilisation germination incubation lungs metamorphosis micro-organisms nutrients organism ovary photosynthesis pollen pollination puberty pulse rate reproduce seed dispersal sexual reproduction solvents stamen stigma style valves vein ventricle	**Key vocabulary (tier 2)** accurate atmosphere chemical cooling diagram energy factor free gas heating liquid occur properties rate recognise result reversible slide solid source substance temperature water cycle	**Key vocabulary (tier 3)** boil change of state condense dissolve evaporate freeze line graph melt particle solidify solution surface area variable	**Key vocabulary (tier 2)** apparent approximately cause communicate comparative contribute contributions daylight depend eardrums evaluate evidence features gas identify instruments interpret liquid loudness material medium model Moon muffle nerve endings observe pattern planet produce record refute seasons solid sound speed sphere spherical star Sun sunlight sunrise sunset support table tilt volume	**Key vocabulary (tier 3)** amplify amplitude asteroid comet echo frequency galaxy gravity insulator Milky Way Orbit particle phases of the Moon pitch reflect rotate solar system sound wave stimulate tuning fork universe vacuum vibration

Y6 Science

Working scientifically

Key skills
To be able to plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.

To be able to take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.

To be able to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

To be able to use test results to make predictions to set up further comparative and fair tests.

To be able to report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.

To be able to identify scientific evidence that has been used to support or refute ideas or arguments.

Trips/Workshops
Natural History Museum

Living things (Biology)

Plants, animals including humans, habitats, evolution and inheritance
Living things and their habitat. Evolution and Inheritance
Visits: Natural History Museum

Key knowledge
Topic: Living things and their habitats
To know all living things exhibit 7 common characteristics (MRS GREN).

To know scientists who classify living things are called taxonomists.

To know animals can be sorted or classified in a number of different ways. One example of this is through answering a series of closed questions using a branched key diagram.

To know a micro-organism is an organism that is microscopic, for example a bacterium, fungus and virus.

To know a food chain shows a feeding relationship between organisms in a particular habitat. As you progress along the food chain, each successive organism eats the previous one.

To know most animals are part of more than one food chain and eat more than one kind of food in order to meet their food and energy requirements. These interdependent food chains form a food web.

Topic: Evolution and inheritance
To know adaptation is about how well suited an organism is to survive in the habitat in which it lives. The habitat determines the features that are needed in order for an organism to survive.

To know characteristics of an organism can change over time (evolution) – there is evidence in the form of fossils to show this.

To know there are many factors that contribute to the extinction of an organism.

To know the work of Mary Anning and Charles Darwin have contributed greatly to the field of science.

To know natural selection is the mechanism through which evolution occurs.

Key skills
Topic: Living things and their habitats
To be able to describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.

To be able to give reasons for classifying plants and animals based on specific characteristics.

To be able to ask questions.

To be able to observe characteristics of organisms.

To be able to record classification of organisms in a branched key diagram.

To be able to research key aspects of taxonomy.

To be able to research Carl Linnaeus's contribution to taxonomy.

To be able to report and present findings.

To be able to observe micro-organisms through microscopes.

To be able to record observations using scientific diagrams.

Topic: Evolution and inheritance
To be able to describe how living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.

To be able to explain how living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.

To be able to identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

To be able to report and present findings from enquiries into the work of Mary Anning.

To be able to identify scientific evidence that has been used to support or refute the theory of evolution.

Key vocabulary (tier 2)
animal
classify
(common) characteristic
environment
inhabited
plant
sorted
species
survive

Key vocabulary (tier 3)
bacteria
branched keys
classification
consumer (primary, secondary, tertiary and quaternary)
evolution
extinction
food chain
food pyramid
food web
fungi
inheritance
interdependence
adaptation
natural selection
offspring
predator (apex)
prey
producer
variation
vertebrate
taxonomy
virus
microorganism

Materials (Chemistry)

Materials and their properties, rocks, states of matter
Irreversible changes

Key knowledge
Topic: Irreversible changes
To know reversible and irreversible reactions are different.

To know a reversible change is a change that can be undone or reversed. It might change how a material looks or feels, but it doesn't create new materials (e.g. dissolving, evaporation, melting and freezing).

To know an irreversible change is a change that cannot be reversed. New materials are always formed. Sometimes these new materials are useful to us.

To know heating (e.g. raw egg) and mixing (bicarbonate of soda and vinegar) can both cause an irreversible change.

To know burning is an example of an irreversible change.

To know chemical reactions produce a new substance. Example: baking a cake. The heat from the oven causes the baking powder to react with the other ingredients and change into sodium carbonate, water, and most importantly, the gas carbon dioxide.

To know physical changes do not produce a new substance. Example: melting ice. The melted ice can be frozen back to a solid.

Key skills
Topic: Irreversible changes
To be able to explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

To be able to use scientific language and diagrams to communicate their understanding of difference between physical changes and chemical reactions, and reversible and irreversible changes.

To be able to explain that light appears to travel in straight lines.

Key vocabulary (tier 2)
chemical reaction
condense
dissolve
evaporate
gas
irreversible
liquid
melt
mixture
physical change
reversible
solid
substance

Key vocabulary (tier 3)
carbon dioxide
(in)soluble
product
reactant
saturated
sodium carbonate
solute
solvent solution

Science of matter (Physics)

Forces, magnets, seasonal changes, electricity, light, earth and space and light and sound

Key knowledge
Topic: Light
To know light travels in a straight line.

To know when light hits an object with a smooth surface, it reflects at the same angle as it hits the object (angle of reflection).

To know when light travels from one material into another material, it bends. This is called refraction.

To know objects can be seen when light from a light source reflects off them and travels into our eye.

To know shadows are formed because light travels in a straight line.

To know when an object blocks the light travelling from a light source, it causes a shadow behind it.

To know white light that comes from the Sun and other sources, such as a torch, is made up of a number of colours (red, orange, yellow, green, blue, indigo, violet) but we cannot see these because they are mixed together. The light can be split into the separate colours with a prism (dispersion).

Key skills
Topic: Light
To be able to explain that light appears to travel in straight lines.

To be able to use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.

To be able to explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.

To be able to use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

To be able to use scientific language and diagrams to communicate their understanding of how light travels.

To be able to plan, conduct and evaluate a fair test to answer their own question about causal relationship between light source and shadow.

To be able to identify and control variables.

To be able to take measurements of shadow size with accuracy and precision.

To be able to record data about shadow size using tables and present it using line graphs.

To be able to use test results to consider further tests.

Key vocabulary (tier 2)
Accuracy
(causal) relationship
factor
light source
precision
ray
reflection (angle of)
shadow

Key vocabulary (tier 3)
(angle of) refraction
dispersion
incidence (angle of)
infra-red
opaque
prism
spectrum
translucent
transparent
ultra-violet
variable