St. Andrew's
Church of England Primary School
ENRICHING LIVES

Science
Curriculum Journey

1. What is Science?

Science is having knowledge and understanding of our world, whilst having the skills associated with science as a process of enquiry. It develops the natural curiosity of the child, encourages respect for living organisms and the physical environment and provides opportunities for critical evaluation of evidence.

2. Through the eyes of our children, science is important because:

'It helps us to develop our knowledge that we can learn and decide how to solve problems and understand how things work.'

3. Curriculum Intent

At St. Andrew's, Church of England Primary School, we aim for our children to be inquisitive throughout their time at the school and beyond. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes. Throughout the programmes of study, the children we aim for our children to acquire and develop the key knowledge that has been identified within each unit and across each year group, as well as the application of scientific skills. We ensure that the Working Scientifically skills are built on and developed throughout children's time at the school, so that they can apply their knowledge of science when using equipment, conducting experiments, building arguments and explaining concepts confidently and continue to ask questions and be curious about their surroundings.

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.

4. Implementation

The teaching and implementation of the science curriculum at St. Andrew's C.E. Primary School is based on the Early Learning Goals and National Curriculum and supported by expectations from Chris Quigley Milestones, ensuring a well-structured approach.

Our pupils should be able to organise their knowledge, skills and understanding on the following key concepts:

- Work scientifically;
- Understand plants;
- Understand animals and humans;
- Investigate living things;
- Understand evolution and inheritance;
- Investigate materials;

- Understand movement, forces and magnets;
- Understand the Earth's movement in space
- Investigate light and seeing
- Investigate sound and hearing
- Understand electrical circuits.

These key concepts underpin learning in each milestone. This enables pupils to reinforce and build upon prior learning, make connections and develop subject specific language.

Our science curriculum is taught each term throughout year and in KS1 and KS2 children have weekly lessons using a variety of resources. In Early years, science is taught through the children learning about the world around them in their learning through play.

Through planning, problem solving opportunities are planned to that allow children to solve problems for themselves. Planning also ensures that learning and skill development from previous years is structured and progressive. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. A range of high-quality resources are used to aid understanding of conceptual knowledge. Working Scientifically skills are embedded into lessons to ensure these skills are being developed throughout the children's school career and new vocabulary and challenging concepts are introduced through direct teaching.

5. Impact

By the end of each key stage, pupils are expected to know, apply and understand the content, skills and processes specified in the relevant programme of study. At St. Andrew's, at the end of each science unit of work, we use summative assessment (based on the objectives in the 2014 National Curriculum and the Chris Quigley Outcomes to determine children's understanding and inform future planning.

6. Programmes of Study

6.1 Programmes of Study

EYFS	KS1	KS2
Understanding the World **30-50 months** • Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world. • Can talk about some of the things they have observed such as plants, animals, natural and found objects. • Talks about why things happen and how things work. • Developing an understanding of growth, decay and changes over time. • Shows care and concern for living things and the environment. **40-60 months** • Looks closely at similarities, differences, patterns and change.	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 will be encouraged to be curious and ask questions about what they notice. They will 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	**LKS2** 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** • Ask relevant questions and using different types of scientific enquiries to answer them. • Set up simple practical enquiries, comparative and fair tests. • Make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. • Gather, record, classify and present data in a variety of ways to help in answering questions. • Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and

	scientifically' is described separately but is always be taught through and clearly related to the teaching of substantive science content in the programme of study. **Scientific Method** • Ask simple questions and recognising that they can be answered in different ways. • Observe closely, using simple equipment. • Perform simple tests. • Identify and classify. • Use their observations and ideas to suggest answers to questions. • Gather and recording data to help in answering questions. **Plants** • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Identify and describe the basic structure of a variety of common flowering plants, including trees. • Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. **Animals, including humans** • Identify and name a variety of common	conclusions. • Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. • Identify differences, similarities or changes related to simple scientific ideas and processes. • Use straightforward scientific evidence to answer questions or to support their findings. **Plants** • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. • Investigate the way in which water is transported within plants. • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. **Animals, including humans Y3** • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement. • Describe the simple functions of the basic parts of the digestive system in humans. • Identify the different types of teeth in humans and their simple functions. • Construct and interpret a variety of food chains, identifying producers, predators and prey. **Animals including humans Y4** • Describe the simple functions of the basic parts of the digestive system in humans. • Identify the different types of teeth in humans and their simple functions. • Construct and interpret a variety of food chains, identifying producers, predators and prey.

	animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets). • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. • Notice that animals, including humans, have offspring which grow into adults. • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. **Living things and their habitats** • Explore and compare the differences between things that are living, dead, and things that have never been alive.	**States of matter** • Compare and group materials together, according to whether they are solids, liquids or gases. • Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **Living things and their habitats** • Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. • Recognise that environments can change and that this can sometimes pose dangers to living things. **Rocks** • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. • Recognise that soils are made from rocks and organic matter. **Light** • Recognise that they need light in order to see things and that dark is the absence of light • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. • find patterns in the way that the size of shadows change.

	• 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. • Identify and name a variety of plants and animals in their habitats, including microhabitats. • 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. **Everyday materials** • Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their simple physical properties. • Uses of everyday materials • Identify and compare the suitability of a variety of everyday materials, including	**Sound** • Identify how sounds are made, associating some of them with something vibrating. • Recognise that vibrations from sounds travel through a medium to the ear. • Find patterns between the pitch of a sound and features of the object that produced it • Find patterns between the volume of a sound and the strength of the vibrations that produced it. • Recognise that sounds get fainter as the distance from the sound source increases. **Forces and magnets** • Compare how things move on different surfaces. • Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having 2 poles. • Predict whether 2 magnets will attract or repel each other, depending on which poles are facing. **Electricity** • Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors

	wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. **Seasonal changes** • Observe changes across the 4 seasons. • Observe and describe weather associated with the seasons and how day length varies.	**UKS2** 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 will 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 will encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They will also begin to recognise that scientific ideas change and develop over time. They will 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 will 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 is always taught through and clearly related to the science content. **Working scientifically** • Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. • Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. • Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • Use test results to make predictions to set up further comparative and fair tests. • Report and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a 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. **Living things and their habitats** • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. • Give reasons for classifying plants and animals based on specific characteristics. • Describe the life process of reproduction in some plants and animals. • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals. **Animals, including humans** • Describe the changes as humans develop to old age. • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • Describe the ways in which nutrients and water are transported within animals, including humans. **Evolution and inheritance** • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. **Light** • Recognise that light appears to travel in

		straight lines. • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. **Electricity** • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram. • Properties and changes of materials • 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. • Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. **Earth and space**

		• Describe the movement of the Earth and other planets relative to the sun in the solar system • Describe the movement of the moon relative to the Earth. • Describe the sun, Earth and moon as approximately spherical bodies. • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. **Forces** • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. • Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.

6.2 Programmes of Study - Next Steps

KS3
The principal focus of science teaching in key stage 3 is to develop a deeper understanding of a range of scientific ideas in the subject disciplines of biology, chemistry and physics. Pupils should begin to see the connections between these subject areas and become aware of some of the big ideas underpinning scientific knowledge and understanding. They should be encouraged to relate scientific explanations to phenomena in the world around them and start to use modelling and abstract ideas to develop and evaluate explanations. Pupils should understand that science is about working objectively, modifying explanations to take account of new evidence and ideas and subjecting results to peer review. Pupils should decide on the appropriate type of scientific enquiry to undertake to answer their own questions and develop a deeper understanding of factors to be taken into account when collecting, recording and processing data. They should evaluate their results and identify further questions arising from them. 'Working scientifically' is described separately at the beginning of the programme of study, but is taught through and clearly related to substantive science content in the programme of study. Pupils should develop their use of scientific vocabulary, including the use of scientific nomenclature and units and mathematical representations. **Working scientifically** Through the content across all three disciplines, pupils should be taught to: **Scientific attitudes** • Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility. • Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review. • Evaluate risks. **Experimental skills and investigations** • Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience. • Make predictions using scientific knowledge and understanding. • Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables. • Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety. • Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements. • Apply sampling techniques. **Analysis and evaluation** • Apply mathematical concepts and calculate results. • Present observations and data using appropriate methods, including tables and graphs. • Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions. • Present reasoned explanations, including explaining data in relation to predictions and hypotheses.

- Evaluate data, showing awareness of potential sources of random and systematic error.
- Identify further questions arising from their results.

Measurement

- Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature.
- Use and derive simple equations and carry out appropriate calculations.
- Undertake basic data analysis including simple statistical techniques.

BIOLOGY

Pupils should be taught about:

Structure and function of living organisms.

Cells and organisation.

- Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope.
- The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts.
- The similarities and differences between plant and animal cells.
- The role of diffusion in the movement of materials in and between cells.
- The structural adaptations of some unicellular organisms.
- The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.
- The skeletal and muscular systems.
- The structure and functions of the human skeleton, to include support, protection, movement and making blood cells.
- Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles.
- The function of muscles and examples of antagonistic muscles.

Nutrition and digestion

- The content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed.
- Calculations of energy requirements in a healthy daily diet
- The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases
- The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)
- The importance of bacteria in the human digestive system
- Plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots.

Gas exchange systems

- The structure and functions of the gas exchange system in humans, including adaptations to function
- The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume.
- The impact of exercise, asthma and smoking on the human gas exchange system.

- The role of leaf stomata in gas exchange in plants.

Reproduction

- Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.
- Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.

Health

The effects of recreational drugs (including substance misuse) on behaviour, health and life processes

Material cycles and energy

Photosynthesis

- The reactants in, and products of, photosynthesis, and a word summary for photosynthesis.
- The dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere.
- The adaptations of leaves for photosynthesis.

Cellular respiration

Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life

A word summary for aerobic respiration

The process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration

The differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.

Interactions and interdependencies

Relationships in an ecosystem

- The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops.
- The importance of plant reproduction through insect pollination in human food security.
- How organisms affect, and are affected by, their environment, including the accumulation of toxic materials.

Genetics and evolution

- Inheritance, chromosomes, DNA and genes
- Heredity as the process by which genetic information is transmitted from one generation to the next
- A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model.

Differences between species

- The variation between individuals within a species being continuous or discontinuous, to include

measurement and graphical representation of variation.

- The variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection.
- Changes in the environment which may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction.
- The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.
- The light year as a unit of astronomical distance.

CHEMISTRY

Pupils should be taught about:

The particulate nature of matter

- The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure.
- Changes of state in terms of the particle model.

Atoms, elements and compounds

- A simple (Dalton) atomic model.
- Differences between atoms, elements and compounds.
- Chemical symbols and formulae for elements and compounds.
- Conservation of mass changes of state and chemical reactions.

Pure and impure substances

- The concept of a pure substance.
- Mixtures, including dissolving.
- Diffusion in terms of the particle model.
- Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography.
- The identification of pure substances.

Chemical reactions

- Chemical reactions as the rearrangement of atoms.
- Representing chemical reactions using formulae and using equations.
- Combustion, thermal decomposition, oxidation and displacement reactions.
- Defining acids and alkalis in terms of neutralisation reactions.
- The pH scale for measuring acidity/alkalinity; and indicators.
- Reactions of acids with metals to produce a salt plus hydrogen.
- Reactions of acids with alkalis to produce a salt plus water.
- What catalysts do.

Energetics

- Energy changes on changes of state (qualitative).
- Exothermic and endothermic chemical reactions (qualitative).

The periodic table

- The varying physical and chemical properties of different elements.

- The principles underpinning the Mendeleev periodic table.
- The periodic table: periods and groups; metals and non-metals.
- How patterns in reactions can be predicted with reference to the periodic table.
- The properties of metals and non-metals.
- The chemical properties of metal and non-metal oxides with respect to acidity.

Materials

- The order of metals and carbon in the reactivity series.
- The use of carbon in obtaining metals from metal oxides.
- Properties of ceramics, polymers and composites (qualitative).

Earth and atmosphere

- The composition of the Earth
- The structure of the Earth
- The rock cycle and the formation of igneous, sedimentary and metamorphic rocks

Earth as a source of limited resources and the efficacy of recycling

- The composition of the atmosphere
- The production of carbon dioxide by human activity and the impact on climate

PHYSICS

Pupils should be taught about:

Energy

- Calculation of fuel uses and costs in the domestic context.
- Comparing energy values of different foods (from labels) (kJ).
- Comparing power ratings of appliances in watts (W, kW).
- Comparing amounts of energy transferred (J, kJ, kW hour).
- Domestic fuel bills, fuel use and costs.
- Fuels and energy resources.

Energy changes and transfers

- Simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged.
- Heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators.
- Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.

Changes in systems

- Energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change.
- Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions.

- Using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.

Motion and forces

Describing motion

- Speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)
- the representation of a journey on a distance-time graph.
- Relative motion: trains and cars passing one another.

Forces

- Forces as pushes or pulls, arising from the interaction between 2 objects.
- Using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces.
- Moment as the turning effect of a force.
- Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water
- Forces measured in newtons, measurements of stretch or compression as force is changed.
- Force-extension linear relation; Hooke's Law as a special case.
- Work done and energy changes on deformation.
- Non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity.

Pressure in fluids

- Atmospheric pressure decreases with increase of height as weight of air above decreases with height.
- Pressure in liquids, increasing with depth; upthrust effects, floating and sinking.
- Pressure measured by ratio of force over area – acting normal to any surface.

Balanced forces

- Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface

Forces and motion

- Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only).
- Change depending on direction of force and its size.

Waves

Observed waves

Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition

Sound waves

- Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound.
- Sound needs a medium to travel, the speed of sound in air, in water, in solids.
- sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal.

- The auditory range of humans and animals.

Energy and waves

- Pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone.

Light waves

- The similarities and differences between light waves and waves in matter.
- Light waves travelling through a vacuum; speed of light.
- The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface.
- Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye.
- Light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras.
- Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.

Electricity and electromagnetism

Current electricity

- Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge
- Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current
- Differences in resistance between conducting and insulating components (quantitative)

Static electricity

- Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects.
- The idea of electric field, forces acting across the space between objects not in contact.

Magnetism

- Magnetic poles, attraction and repulsion.
- Magnetic fields by plotting with compass, representation by field lines.

Earth's magnetism, compass and navigation

- the magnetic effect of a current, electromagnets, DC motors (principles only)

Matter

Physical changes

- Conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving.
- Similarities and differences, including density differences, between solids, liquids and gases.

Brownian motion in gases

- Diffusion in liquids and gases driven by differences in concentration.

- The difference between chemical and physical changes.

Particle model

- The differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition.
- Atoms and molecules as particles.

Energy in matter

- Changes with temperature in motion and spacing of particles.
- Internal energy stored in materials.

Space Physics

- Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and sun (qualitative only).
- Our sun as a star, other stars in our galaxy, other galaxies.
- The seasons and the Earth's tilt, day length at different times of year, in different hemispheres.

7. Progression

- through each strand

7.1 Progression in EYFS

	Development Matters & ELG
Nursery	**Communication and Language** • Use a wider range of vocabulary. • Understand 'why' questions, like: "Why do you think the caterpillar got so fat? **Personal, Social, Emotional development** • Select and use activities and resources, with help when needed. This helps them to achieve a goal they have chosen, or one which is suggested to them. **Physical Development** • Use one-handed tools and equipment, for example, making snips in paper with scissors. • Be increasingly independent in meeting their own care needs, e.g. brushing teeth, using the toilet, washing and drying their hands thoroughly. • Make healthy choices about food, drink, activity and toothbrushing. **Literacy** • Engage in extended conversations about stories, learning new vocabulary **Mathematics** • Describe a familiar route. • Discuss routes and locations, using words like 'in front of' and 'behind'. • Make comparisons between objects relating to size, length, weight and capacity **Understanding of the World** • Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Talk about what they see, using a wide vocabulary. • Explore how things work. • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things. • Explore and talk about different forces they can feel. • Talk about the differences between materials and changes they notice. **Expressive Arts and Design** • Explore different materials freely, in order to develop their ideas about how to use them and what to make. • Develop their own ideas and then decide which materials to use to express them. • Join different materials and explore different textures.
Reception	**Communication and Language** • Learn new vocabulary • Use new vocabulary through the day • Ask questions to find out more and to check they understand what has been said to them. • Describe events in some detail • Use talk to help work out problems and organise thinking and activities explain how things work and why they might happen. • Use new vocabulary in different contexts. • Engage in non-fiction books. **Physical Development** • Know and talk about the different factors that support their overall health and wellbeing: regular physical activity, healthy eating, toothbrushing, sensible amounts of 'screen time', having a good sleep routine, being a safe pedestrian

	Mathematics • Compare length, weight and capacity. **Understanding of the World** • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Recognise some environments that are different to the one in which they live. • Understand the effect of changing seasons on the natural world around them.
ELG	**Communication and Language** Listening, attention and understanding • Listen attentively and respond to what they hear with relevant questions, comments and actions when being read to and during whole class discussions and small group interactions. • Make comments about what they have heard and ask questions to clarify their understanding. Speaking • Offer explanations for why things might happen, making use of recently introduced vocabulary from stories, non-fiction, rhymes and poems when appropriate. **Personal, Social, Emotional development** Managing self • Be confident to try new activities and show independence, resilience and perseverance in the face of challenge. • Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices. **Literacy** Comprehension • Use and understand recently introduced vocabulary during discussions about stories, non-fiction, rhymes and poems and during role play. **Understanding of the World** People, culture and communities • Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps. • Explain some similarities and differences between life in this country and life in other countries, drawing on knowledge from stories, nonfiction texts and (when appropriate) maps. **The natural world** • Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter

7.2 Progression in KS1 & KS2 – Animals including humans

Y1/2 Animals including humans	• Identify and name a variety of common animals that are birds, fish, amphibians, reptiles and mammals • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (birds, fish, amphibians, reptiles and mammals, and including pets). • Identify, name draw and label the basic parts of the human body and say which parts of the body is associated with each sense. • Notice that animals, including humans, have offspring which grow into adults • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.
LKS2 Animals including humans	• Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • Identify that humans and some animals have skeletons and muscles for support, protection and movement. • Describe the simple functions of the basic parts of the digestive system in humans • Identify the different types of teeth in humans and their simple functions • Construct and interpret a variety of food chains, identifying producers, predators and prey.
UKS2 Animals including humans <u>Evolution and inheritance</u>	• Identify and name the main parts of the human circulatory system, and explain the functions of the heart, blood vessels and blood • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • Describe the ways in which nutrients and water are transported within animals, including humans. • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

7.3 Progression in KS1 & KS2 – Earth and space

UKS2 Earth and space	• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system • Describe the movement of the Moon relative to the Earth • Describe the Sun, Earth and Moon as approximately spherical bodies • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky

7.4 Progression in KS1 & KS2 – Electricity

LKS2 Electricity	• Identify common appliances that run on electricity • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • Recognise some common conductors and insulators, and associate metals with being good conductors.
UKS2 Electricity	• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • Use recognised symbols when representing a simple circuit in a diagram.

7.5 Progression in KS1 & KS2 – Forces

LKS2 Forces and magnets	• Compare how things move on different surfaces • Notice that some forces need contact between two objects, but magnetic forces can act at a distance • Observe how magnets attract or repel each other and attract some materials and not others • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • Describe magnets as having two poles • Predict whether two magnets will attract or repel each other, depending on which poles are facing.
UKS2 Forces	• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

7.6 Progression in KS1 & KS2 – Light

LKS2 Light	• Recognise that they need light in order to see things and that dark is the absence of light • Notice that light is reflected from surfaces • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes • Recognise that shadows are formed when the light from a light source is blocked by a solid object • Find patterns in the way that the sizes of shadows change.
UKS2 Light	• Recognise that light appears to travel in straight lines • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them
UKS2 Earth and space	• Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky

7.7 Progression in KS1 & KS2 – Living things and their environment

Y1/2 Living things and their habitats	• Explore and compare the differences between things that are living, dead, and things that have never been alive • 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. • Identify and name a variety of plants and animals in their habitats, including micro-habitats • 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.
LKS2 Living things and their habitats	• recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things
UKS2 Living things and their habitats	• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • Describe the life process of reproduction in some plants and animals. • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals • Give reasons for classifying plants and animals based on specific characteristics
<u>Evolution and inheritance</u>	• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.

	• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

7.8 Progression in KS1 & KS2 – Materials

Y1/2 Everyday materials	• Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, water and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their physical properties. • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
LKS2 Rocks, States of matter	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • Describe in simple terms how fossils are formed when things that have lived are trapped within rock • Recognise that soils are made from rocks and organic matter. • Compare and group materials together, according to whether they are solids, liquids or gases • Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
UKS2 Properties and changes of materials	• 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 • Understand that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • Demonstrate that dissolving, mixing and changes of state are reversible changes • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

7.9 Progression in KS1 & KS2 – Plants

Y1/2 Plants	• Identify and name a variety of common plants, including garden plants, wild plants and trees, and those classified as deciduous and evergreen • Identify and describe the basic structure of a variety of common plants including roots, stem/trunk, leaves and flowers. • Observe and describe how seeds and bulbs grow into mature plants • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.
LKS2 Plants	• Identify and describe the functions of different parts of plants; roots, stem, leaves and flowers. • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow) and how they vary from plant to plant. • Investigate the ways in which water is transported within plants. • Explore the role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal
UKS2 <u>Evolution and inheritance</u>	• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

7.10 Progression in KS1 & KS2 – Seasonal change

Y1/2 Seasonal change	• Observe and describe weather associated with the seasons. • Observe and describe how day length varies. • Observe changes across the four seasons.
UKS2 Earth and space	• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system

7.11 Progression in KS1 & KS2 – Sound

LKS2 Sound	• Identify how sounds are made, associating some of them with something vibrating • Recognise that vibrations from a sound travel through a medium to the ear. • Find patterns between the pitch of a sound and features of the object that produced it • Find patterns between the volume of a sound and the strength of the vibrations that produced it. • Recognise that sounds get fainter as the distance from the sound source increases**.**

8. Progression

- in scientific enquiry

8.1 Progression in KS1 & KS2 – Working scientifically (Observations)

Year 1	• Use simple scientific language to talk about or record what they have noticed • Use observations to make suggestions and/or ask questions • Look/observe closely and communicate changes over time • Observe closely using their senses about features or properties of things in the real world
Year 2	• Use simple scientific language from the Year 2 pos to talk about/record what they have noticed • Observe and describe simple processes/cycles/changes with several steps (e.g. growth cycle, simple food chain etc) • Observe closely and communicate with increasing accuracy, the features or properties of things in the real world
Year 3	• Observe and record relationships between structure and function (linked to Y3 pos) • Observe/record changes over time, making appropriate comments/findings • Explore/observe things in the local environment/real contexts and record observations
Year 4	• Use observations to suggest what to do next • Discuss ideas & develop descriptions from their observations using relevant scientific language and vocabulary (Y4 pos) • With support, observe and record relationships between structure and function or between different parts of a process
Year 5	• Discuss ideas & develop descriptions from their observations using relevant scientific language and vocabulary (Y5 pos) • With increasing independence, observe and record relationships between structure and function or between different parts of a process
Year 6	• Discuss ideas & develop descriptions from their observations using relevant scientific language and vocabulary (Y6 pos) • Observe and record relationships between structure and function or between different parts of a process

8.2 Progression in KS1 & KS2 – Working scientifically (Grouping and classifying)

Year 1	• Name/identify common examples and features of objects, materials or living things • With help, decide how to sort and group objects, materials and living things • Compare & contrast simple observable features/characteristics of objects, materials and living things
Year 2	• Name/identify common examples, common features or different uses of a objects, materials or living things • Sort and group objects, materials or living things by observable and/or behavioural features • Compare and contrast a variety of things (objects/materials/living things) - focusing on the similarities as well as the differences
Year 3	• Decide ways and give reasons for sorting, grouping, classifying, identifying things, objects, living things, processes or events based on specific characteristics • Compare/contrast & begin to consider the relationships between different things (e.g structures of plants, functions of plant parts, diets, skeletons of humans & other animals etc) • Record similarities as well as differences (e.g. what do all skeletons have? As well as the differences between skeletons)
Year 4	• Use guides or simple keys to classify/identify a variety of objects/materials/living things • Use own observations to identify and classify • With support, record similarities as well as differences and/or changes related to simple scientific ideas or processes or more complex groups of objects/living things/events (e.g. evaporation & condensation, different food chains, different electrical circuits etc)
Year 5	• With increasing independence, develops own guides or simple keys to classify/identify a variety of objects/materials/living things • With increasing independence, record similarities as well as differences and/or changes related to simple scientific ideas or processes or more complex groups of objects/living things/events (e.g. evaporation & condensation, different food chains, different electrical circuits etc)
Year 6	• Develops own guides or simple keys to classify/identify a variety of objects/materials/living things • Record similarities as well as differences and/or changes related to simple scientific ideas or processes or more complex groups of objects/living things/events (e.g. evaporation & condensation, different food chains, different electrical circuits etc)

8.3 Progression in KS1 & KS2 – Working scientifically (Questioning)

Year 1	• Ask simple questions about what they notice about the world around them • Demonstrate curiosity by the questions they ask
Year 2	• Raise their own questions based on or linked to things they have observed • With help/scaffolds, begin to ask questions with appropriate question stems (e.g. What will happen if……..?
Year 3	• Ask questions such as “what if we tried” or “what if we changed” • Begin to understand that some questions can be tested in the classroom and some cannot • With help, suggest/sort questions that can be explored, observed, tested or investigated further) • Ask relevant questions with appropriate questions stems
Year 4	• Ask/raise own relevant questions, with increasing confidence and independence, that can be explored, tested, observed or investigated further • Choose and select relevant questions that can be answered by research, or test)
Year 5	• Independently ask relevant questions that can be answered through different scientific enquiries • Recognise which questions cannot be answered in the classroom and those that can
Year 6	• Independently ask relevant questions that can be answered through different scientific enquiries • Use knowledge of familiar situations or scientific understanding to suggest further questions for investigation

8.4 Progression in KS1 & KS2 – Working scientifically (Communicating)

Year 1	• Use simple primary and secondary sources (such as objects, books & photographs) to find things out • Complete a pre-constructed table/chart using picture records or simple words • Record simple visual representations of observations made • Begin to use simple scientific language from Y1 pos
Year 2	• With support, record and communicate their findings in a range of ways to a variety of different audiences • Use simple scientific language with increasing accuracy in discussions (year 2 pos) • Record simple data with some accuracy to help in answering questions • With support/frameworks, make decisions about how to complete a variety of tables/charts
Year 3	• Record and present findings using simple scientific language and vocabulary (Y3 pos) (drawing, annotations, oral discussions, notes, pictorial representations, labelled diagrams, tables, charts, displays, presentations) • With support/scaffold, record and present data in a variety of ways to help in answering questions • Communicate findings in ways that are appropriate for different audiences
Year 4	• Record findings using relevant scientific language and vocabulary (Y4 pos), including discussions, oral & written explanations, notes, drawings, pictorial representations, labelled diagrams, tables, charts (scales agreed through discussion) • With help, select the most useful ways to collect, record, present, classify data from a range of choices
Year 5	• Record findings using relevant scientific vocabulary and language (Y5 pos), including discussions, oral & written explanations, notes, drawings, pictorial representations, labelled diagrams, tables, charts (scales beginning to be decided independently on more complex graphs) • With increasing independence, decide on the most suitable ways to collect, record, present, classify data • Chn prepare and produce line graphs based around simple data gathered
Year 6	• Record findings using relevant scientific vocabulary and language (Y6 pos), including discussions, oral & written explanations, notes, drawings, pictorial representations, labelled diagrams, tables, charts (scales decided independently on more complex graphs) • Decide on the most suitable ways to collect, record, present, classify data • Chn prepare and produce line graphs based around increasingly more complex data

8.5 Progression in KS1 & KS2 – Working scientifically (Using equipment and measures)

Year 1	• Measure using non-standard units • Use simple equipment accurately (egg timers, hand lenses)
Year 2	• Measure using non-standard and simple standard measures (e.g. cm, time) with increasing accuracy • Begin to make decisions about which equipment to use • Correctly and safely use equipment provided to make observations and/or take simple measurements
Year 3	• Collect data from their own observations & measurements using notes/simple tables/standard units • With support, decide what observations to make, how long to make them for, type of equipment to use • Make simple accurate measurements using whole number standard units, using a range of equipment
Year 4	• With increasing independence, make decisions about what observations to make, how long for, type of equipment used to make them • Learn & use new equipment, such as data loggers/measure in˚C with thermometers etc • Collect data from own observations and measurements, using notes/simple tables/standard units • Make accurate measurements using standard units, using a range of equipment and scales
Year 5	• Independently, make decisions about what observations to make, how long for, type of equipment used to make them • Use a variety of measuring equipment independently and accurately, and begins to deal with equipment failure independently • With increasing independence, decide when repeat readings are necessary and when to take them
Year 6	• Use a variety of measuring equipment independently and accurately, deals with equipment failure independently • Decide when repeat readings are necessary and when to take them

8.6 Progression in KS1 & KS2 – Working scientifically (Planning and testing)

Year 1	• With help, carry out a simple test/comparative test • With help, make a simple prediction
Year 2	• Carry out simple comparative tests, following a method with some independence • Make a simple prediction and give a reason why (even though it may not be correct) • With support, make suggestions on a method for setting up a simple comparative test
Year 3	• Make a prediction, with reasons, based on everyday experiences/scientific understanding • With support, set up simple practical enquiries, inc comparative and fair tests (e.g. make a choice from a list of variables to change when conducting a fair test) • With support, decide on the best way to answer their own questions
Year 4	• Carry out simple fair tests with increasing confidence investigating the effect of something on something else • With help, decide the most appropriate type of science enquiry they might use to answer scientific questions • Make a prediction based on the knowledge acquired from previous explorations/observations and apply it to a new situation • Explain planning decisions, including decisions about what to change/measure/observe (variables)
Year 5	• With increasing independence, decide on the most appropriate type of science enquiry they might use to answer scientific questions • Independently decide on and manage variables in a fair test, plan steps of an investigation
Year 6	• Decide on the most appropriate type of science enquiry they might use to answer scientific questions • Independently decide on and manage variables in a fair test and begin to recognise those which are not easy to manage, plan steps of an investigation

8.7 Progression in KS1 & KS2 – Working scientifically (Describing patterns/results)

Year 1	• Talk about and describe what has happened, using drawings, recordings, photos etc.
Year 2	• With support, begin to notice patterns in their data (e.g. order their findings, sequence best to worst etc.) • Recognise if results matched predictions • Use their recordings to talk about/describe what happened
Year 3	• With support/scaffold, describe and compare the effect of different factors on something • With support, look for changes and simple patterns in their observations, data, chart or graph • Use results to consider whether they match their prediction
Year 4	• Notice/find patterns in their observations/data (describe the effect of something on something else e.g. as I lengthen the ruler I notice the pitch gets lower)
Year 5	• With increasing independence, notice patterns in results. (e.g. explaining effect of something on something else, using increasingly accurate scientific understanding)
Year 6	• Notice patterns in results. (e.g. explaining effect of something on something else, using increasingly accurate scientific understanding)

8.8 Progression in KS1 & KS2 – Working scientifically (Explaining results)

Year 1	• Begin to use scientific language (from Y1 pos) to talk about what they have found out or why something happened
Year 2	• Begin to use simple scientific language to explain what they found out (Year 2 pos) • Give a simple, logical reason why something happened (e.g. I think…….because……)
Year 3	• Use experience, some evidence or results to draw a simple conclusion to answer their original question • Write simple explanations of why things happened using simple scientific language and vocabulary (Y3 pos)
Year 4	• Begin to develop their ideas about relationships and interactions between things and explain them • Use relevant scientific language and vocabulary (Y4 pos) to begin to explain/say why something happened
Year 5	• Use relevant scientific language and vocabulary (Y5 pos) to begin to explain/say why something happened • With increasing independence, develop ideas about relationships and interactions between things and explain them
Year 6	• Use relevant scientific language and vocabulary (Y6 pos) to begin to explain/say why something happened • Develop ideas about relationships and interactions between things and explain them

9. Themes and Coverage

9.1 At St. Andrew's, we are dedicated to the teaching and delivery of a high-quality science curriculum through well planned and resourced lessons which develop the children's understanding of biology, chemistry and physics through a range of investigations. We have determined that science will be taught each term on a two year cycle in a learning journey that is designed to revisit and extend learning. Where appropriate, the investigative element of the subject will be enhanced through cross-curricular links (electricity and design and technology for example).

9.2 Nursery & EYFS Themes

Scientific elements may be woven across the academic year in EYFS. The following themes are of particular note;

Nursery Cycle A

- Ourselves Links to Animals including humans.
- All About Me! Links to Animals including humans.
- Winter Links to Seasonal change
- At the Seaside/Beach Links to Living things and their habitats

Nursery Cycle B

- My Family and Me Links to Animals including humans.
- On the Farm Links to Animals including humans, Plants
- Pets Links to Animals including humans.

Reception Cycle A

- Colours of the Rainbow
- Autumn Links to Seasonal change
- Space
- Jungle Links to Living things and their habitats, Animals including humans, Plants
- Ready, Steady, Cook Materials

Reception Cycle B

- All About Me Links to Animals including humans.
- Antarctica Links to Living things and their habitats, Animals including humans
- Growing Links to Animals including humans.
- Minibeasts Links to Living things and their habitats, Animals including humans
- Under the Sea Links to Living things and their habitats, Animals including humans

9.3 KS1 – 2 year Summary of Coverage

Cycle A/C – T1	**Seasonal change –** Observe the characteristics of the seasons and describe associated weather and day length variations.
Cycle A/C – T2	**Seasonal change -** Observe the characteristics of the seasons and describe associated weather and day length variations.
Cycle A/C – T3	**Materials –** Differentiate between object and material, identify different materials and their properties. Identify uses of different materials and discover how materials can be changed.
Cycle A/C – T4	**Materials -** Differentiate between object and material, identify different materials and their properties. Identify uses of different materials and discover how materials can be changed.
Cycle A/C – T5	**Plants –** Observe the development of a plant from seed/bulb and describe the requirements of a plant to grow healthily.
Cycle A/C – T6	**Plants -** Observe the development of a plant from seed/bulb and describe the requirements of a plant to grow healthily.
Cycle B/D – T1	**Animals including humans –** Identify common animals and their type and describe and compare their structure. Label basic parts of the human body, recognise that animals have offspring and describe the needs of animals to stay healthy.
Cycle B/D – T2	**Animals including humans-** Identify common animals and their type and describe and compare their structure. Label basic parts of the human body, recognise that animals have offspring and describe the needs of animals to stay healthy.
Cycle B/D – T3	**Living things and their habitats –** Explore different parts of a basic ecosystem and recognise the nature of a habitat. Associate living things and their habitats and understand food chains.
Cycle B/D – T4	**Living things and their habitats -** Explore different parts of a basic ecosystem and recognise the nature of a habitat. Associate living things and their habitats and understand food chains.
Cycle B/D – T5	**Working scientifically –** Conduct a series of investigations to develop the range of working scientifically skills.
Cycle B/D – T6	**Working scientifically -** Conduct a series of investigations to develop the range of working scientifically skills.

9.4 Lower KS2 – 2 year Summary of Coverage

Cycle A/C – T1	**Working scientifically -** Conduct a series of investigations to develop the range of working scientifically skills.
Cycle A/C – T2	**Animals including humans 3 –** Understand the basic nutritional needs of animals and the function of the skeleton and muscles. Understand the digestive system, including the purpose of different teeth and construct food chains.
Cycle A/C – T3	**States of matter –** Group materials depending on their state and understand what leads to a change from liquid to solid to gas. Understand the role of different processes and states in the water cycle.
Cycle A/C – T4	**Rocks –** Compare and group different rocks, understand how fossils form and what soil is.
Cycle A/C – T5	**Living things and their habitats –** Recognise that animals can be grouped and classified and understand the impact of environmental change on animals.
Cycle A/C – T6	**Sound –** Understand how sound are made and heard. Identify changes and patterns in pitch and volume associated with object, vibration and distance.
Cycle B/D – T1	**Working scientifically -** Conduct a series of investigations to develop the range of working scientifically skills.
Cycle B/D – T2	**Electricity –** Identify electrical appliances and conduct a series of investigations into different circuits and components. Recognise common conductors and insulators.
Cycle B/D – T3	**Forces and magnets –** Explore friction associated with movement and recognise different forces. Explore magnetic attraction and repulsion based on pole and material.
Cycle B/D – T4	**Light –** Relate vision and light and understand different light sources. Understand the formation of shadows and how they change.
Cycle B/D – T5	**Plants –** Describe the different parts of a plant and their requirements for growth. Investigate water transport in plants and understand the role of flowers.
Cycle B/D – T6	**Animals including humans 4-** Develop understanding of the digestive system and the function of teeth. Explore a variety of food chains.

9.5 Upper KS2 - 2 year Summary of Coverage

Cycle A/C – T1	**Working scientifically -** Conduct a series of investigations to develop the range of working scientifically skills.
Cycle A/C – T2	**Animals including humans Y6 –** Describe the developmental stages of humans and understand the circulatory system. Understand the impact of different factors on the function of the body and describe nutrient and water transport.
Cycle A/C – T3	**Electricity –** Relate voltage and component function and recognise different circuit symbols.
Cycle A/C – T4	**Evolution and inheritance –** Recognise the change in living things over time and between parent and offspring. Identify different adaptations to the environment by plants and animals.
Cycle A/C – T5	**Living things and their habitat Y6** – Build on prior knowledge to describe and explain the classification of organisms.
Cycle A/C – T6	**Light –** Understand how light travels and how we see. Explain the shape of shadows.
Cycle B/D – T1	**Working scientifically -** Conduct a series of investigations to develop the range of working scientifically skills.
Cycle B/D – T2	**Forces –** Understand gravity and explain the impact of air resistance, water resistance and friction. Recognise the impact of pulleys, levers and gears.
Cycle B/D – T3	**Animals including humans Y5 –** Describe the changes as humans develop to old age.
Cycle B/D – T4	**Earth and Space –** Describe the movement of the Earth and the Moon. Explain day and night and the apparent movement of the sun across the sky.
Cycle B/D – T5	**Properties and changes to materials –** Group materials according to their properties and use knowledge of states of matter and dissolving to separate substances. Understand reversible and non-reversible reactions.
Cycle B/D – T6	**Living things and habitats Y5-** Describe different life-cycles and the processes of reproduction. Describe and explain the classification of different organisms.

10. Medium Term Plans

10.1. Progression across Cycle A & C

	Nursery	Reception	KS1	Lower KS2	Upper KS2
Term 1	• Ourselves • All About Me! • Winter • At the Seaside/Beach	• Colours of the Rainbow • Autumn • Space • Jungle • Ready, Steady, Cook	**Seasonal change –** Observe the characteristics of the seasons and describe associated weather and day length variations.	**Working scientifically -** Conduct a series of investigations to develop the range of working scientifically skills.	**Working scientifically -** Conduct a series of investigations to develop the range of working scientifically skills.
Term 2			**Seasonal change -** Observe the characteristics of the seasons and describe associated weather and day length variations.	**Animals including humans i –** Understand the basic nutritional needs of animals and the function of the skeleton and muscles. Understand the digestive system, including the purpose of different teeth and construct food chains.	**Animals including humans i –** Describe the developmental stages of humans and understand the circulatory system. Understand the impact of different factors on the function of the body and describe nutrient and water transport.
Term 3			**Materials –** Differentiate between object and material, identify different materials and their properties. Identify uses of different materials and discover how materials can be changed.	**States of matter –** Group materials depending on their state and understand what leads to a change from liquid to solid to gas. Understand the role of different processes and states in the water cycle.	**Electricity –** Relate voltage and component function and recognise different circuit symbols.
Term 4			**Materials -** Differentiate between object and material, identify different materials and their properties. Identify uses of different materials and discover how materials can be changed.	**Rocks –** Compare and group different rocks, understand how fossils form and what soil is.	**Evolution and inheritance –** Recognise the change in living things over time and between parent and offspring. Identify different adaptations to the environment by plants and animals.
Term 5			**Plants –** Observe the development of a plant from seed/bulb and describe the requirements of a plant to grow healthily.	**Living things and their habitats –** Recognise that animals can be grouped and classified and understand the impact of environmental change on animals.	**Living things and their habitat i –** Build on prior knowledge to describe and explain the classification of organisms.
Term 6			**Plants -** Observe the development of a plant from seed/bulb and describe the requirements of a plant to grow healthily.	**Sound –** Understand how sound are made and heard. Identify changes and patterns in pitch and volume associated with object, vibration and distance.	**Light –** Understand how light travels and how we see. Explain the shape of shadows.

10.2 Progression across Cycle B & D

	Nursery	Reception	KS1	Lower KS2	Upper KS2
Term 1	• My Family and Me • On the Farm • Pets	• All About Me • Antarctica • Growing • Minibeasts • Under the Sea	**Animals including humans –** Identify common animals and their type and describe and compare their structure. Label basic parts of the human body, recognise that animals have offspring and describe the needs of animals to stay healthy.	**Working scientifically -** Conduct a series of investigations to develop the range of working scientifically skills.	**Working scientifically -** Conduct a series of investigations to develop the range of working scientifically skills.
Term 2			**Animals including humans-** Identify common animals and their type and describe and compare their structure. Label basic parts of the human body, recognise that animals have offspring and describe the needs of animals to stay healthy.	**Electricity –** Identify electrical appliances and conduct a series of investigations into different circuits and components. Recognise common conductors and insulators.	**Forces –** Understand gravity and explain the impact of air resistance, water resistance and friction. Recognise the impact of pulleys, levers and gears.
Term 3			**Living things and their habitats –** Explore different parts of a basic ecosystem and recognise the nature of a habitat. Associate living things and their habitats and understand food chains.	**Forces and magnets –** Explore friction associated with movement and recognise different forces. Explore magnetic attraction and repulsion based on pole and material.	**Animals including humans ii –** Describe the changes as humans develop to old age.
Term 4			**Living things and their habitats -** Explore different parts of a basic ecosystem and recognise the nature of a habitat. Associate living things and their habitats and understand food chains.	**Light –** Relate vision and light and understand different light sources. Understand the formation of shadows and how they change.	**Earth and Space –** Describe the movement of the Earth and the Moon. Explain day and night and the apparent movement of the sun across the sky.
Term 5			**Working scientifically –** Conduct a series of investigations to develop the range of working scientifically skills.	**Plants –** Describe the different parts of a plant and their requirements for growth. Investigate water transport in plants and understand the role of flowers.	**Properties and changes to materials –** Group materials according to their properties and use knowledge of states of matter and dissolving to separate substances. Understand reversible and non-reversible reactions.
Term 6			**Working scientifically -** Conduct a series of investigations to develop the range of working scientifically skills.	**Animals including humans ii-** Develop understanding of the digestive system and the function of teeth. Explore a variety of food chains.	**Living things and habitats ii-** Describe different life-cycles and the processes of reproduction. Describe and explain the classification of different organisms.

11. Vocabulary

11.1. Progression in Vocabulary

The teaching and use of appropriate vocabulary forms an important part of teaching learning. These age specific 'key word' lists identify the vocabulary that we expect teachers to be using. In addition, specific key words (must words) will be selected from these lists for each unit of work for inclusion in the knowledge organisers.

These lists will continue to be updated and refined on an annual basis.

11.2

EYFS Nursery	Vocabulary	Definition
	unique	One of a kind.
	spring	The season when temperatures start to rise and flowers start to grow.
	winter	The coldest season of the year.
	temperature	Measurement of heat.
	summer	The warmest season of the year.
	hydrated	Replacing fluids in the body.
	measure	A way of showing how much or great something is.
	sow	Planting a seed.

11.3

EYFS Reception

Vocabulary	Definition
herbivore	An animal that eats plants.
carnivore	An animal that eats other animals.
fossil	Remains or impression of a plant or animal preserved in rock.
environment	The surrounding where we live.
pollution	Something in the environment that can be harmful.
grow	To change in size or develop.
experiment	A test done to discover something.
compare	To note similarities and differences between things.
materials	What something is made of.
planet	A large, round mass of rock that moves in a circular path around the sun.
star	A huge, glowing ball of gas.
habitat	The natural home of a plant or animal.
diet	The kinds of food that a human or animal eats.

11.4

Key Stage 1

Vocabulary	Definition
Animals including humans	
mammal	Mammals are animals that breathe air, grow hair or fur and feed on their mother's milk as a baby.
amphibian	Amphibians live in the water as babies and on land as they grow older.
carnivore	Animals that mostly eat other animals (meat).
herbivore	Animals that only eat plants.
omnivore	Animals that eat both other animals and plants.
senses	Our body has five senses: sight, smell, touch, taste and hearing.
offspring	The young of an animal.
life cycle	The changes living things go through to become an adult.
young	Offspring that has not reached adulthood
diet	The food and water that an animal needs.
exercise	A physical activity to keep your body fit.
hygiene	How we keep ourselves and the world around us clean so we can stay healthy and stop germs spreading.
Living things and their habitats	
living thing	Living things are things (e.g. plants, humans and animals) that are alive.
non-living thing	Things that are not alive and have never been alive.
life processes	The things that all living things do. They move, breathe, sense, grow, make
habitat	A natural home or environment for plants, animals and other living things.
microhabitat	A very small habitat in places such as; under a rock, under leaves or on a branch.
minibeast	A small creature like an insect, worm or spider.
food chain	A food chain shows how each animal gets its food.
food source	This is the place a living thing's food comes from.
dependent	Many living things in a habitat depend on each other. This means they need each other for different things.

Key Stage 1

Vocabulary	Definition
predators	Animals that eat other animals are called predators. The animals that they eat are called prey.
reproduce	To make more animals and plants.
Plants	
deciduous	Trees that shed their leaves in winter; their leaves are usually wide and flat.
evergreen	Trees that keep their leaves all year around; they often have leaves shaped like needles.
leaves	The flattened part of a plant that is usually green and is attached by a stalk. Leaves help the plant to produce food.
flowers	The seed-bearing part of a plant.
petals	The brightly coloured part of the flower that attracts insects to pollinate the plant.
fruits	The sweet and fleshy product of a plant that contains a seed. They are often eaten.
roots	The part of a plant that attached to the ground and takes in water and nutrients.
trunk	The main woody stem of a tree.
stem	The stalk of a plant or shrub.
branches	Part of a tree that grows out from the trunk.
seed	The part of a plant that will grow into a new plant.
germinate	When a seed forms a small root and/or shoot.
reproduce	To make more animals and plants.
Everyday materials	
property	A characteristic of a material e.g. hard, bendy, shiny etc.
group	Materials can be placed in groups based on their properties e.g. wood, metal, glass etc.
changing materials	To squash, bend, twist, stretch, heat, cool, freeze, melt, boil.
natural	When a material is used in its raw state e.g. wooden door.
manufactured	When a raw material is made into a new one e.g. wood into paper.
raw material	A material found in nature e.g. wood.

Key stage 1

Vocabulary	Definition
twist	To bend and curl.
stretch	To make longer and wider without tearing.
bend	To force something straight into a curve or angle.
squash	To crush or squeeze something so that it becomes flat or out of shape.
rough	Something with an uneven surface.
smooth	Something with an even surface.
Seasonal changes	
summer	The warmest season of the year.
spring	The season after winter and before summer when vegetation starts to appear.
autumn	The season after summer and before winter when trees lose their leaves.
winter	The coldest season of the year.
Sun	A sun is a star, a giant ball of hot gas. Our Sun makes life possible on Earth.
day	A day lasts 24 hours and during this time the Earth spins once on its axis.
season	The four seasons (autumn, winter, spring, summer) we experience on our planet are caused by the Earth's tilt as it rotates around the Sun.
light	Light is the energy that allows us to see the world. A light source makes light by using another kind of energy (for example heat or nuclear energy).
Moon	A moon is a celestial object that orbits the Earth.
Working scientifically	
data	A set of facts or measurements.
compare	To consider the similarities and differences between objects.
classify	To group items together that have similar features.
observe	To notice or watch.
describe	To draw or put in writing what you have observed.

11.5

Lower Key stage 2

Vocabulary	Definition
Working scientifically	
classifying	Grouping objects according to their properties or characteristics.
conclusion	To make a judgment or decision based on facts and information gathered.
evidence	Facts or information that supports whether something is true or not.
fair test	A fair test changes only one thing when attempting to answer a scientific question.
investigation	Researching or working systematically.
prediction	A good guess about what you expect to happen in an investigation.
relevant-	Closely connected or associated with an idea or object.
systematically	Working methodically according to a plan.
Electricity	
appliance	A piece of equipment designed to do a particular job eg washing clothes.
circuit	A complete and closed path along which electricity flows.
cell	A battery.
parallel circuit	A circuit in which the current divides into two or more paths.
series circuit	A series circuit has one looped bath along which the current travels.
switch	A device for making and breaking the connection in an electric circuit.
insulator	A substance or device which does not readily conduct electricity.
conductor	A material or device that allows electricity to flow through it.
Forces and magnets	
pull	The force of attraction between two objects.
repel	Force away.
poles	The two ends of a magnet are known as the north pole and the south pole.

Lower Key stage 2

Vocabulary	Definition
force	A push or pull in a certain direction.
newton	A unit of force.
friction	The force between two surfaces that are trying to slide across each other.
magnet	A material that produces a magnetic force on a magnetic material such as iron.
magnetic	The force (push or pull) experienced by certain metals.
Light	
light source	Something that gives out its own light.
shadow	When light rays are blocked by something opaque.
reflect	When light bounces off a smooth shiny surface.
opaque	A material that does not let light pass through. You cannot see through it. It makes a dark shadow.
translucent	A material that allows light to shine through, although you cannot see through it clearly.
transparent	A material that you can see through perfectly clearly.
compass	An instrument that uses a magnetic needle to show where North is. It also shows the directions of East, South and West.
Plants	
nutrients	These substances are needed by a living thing to grow and survive.
fertilisation	When the male and female parts of the flower have mixed in order to make seeds for new plants.
stamen	The male parts of the flower. The stamen is made up of the anther and the filament. The filament holds up the anther. The anther makes pollen.
carpel (pistil)	The female parts of the flower.
sepal	A leaf-like structures that protect the flower and petals before they open out.
pollination	When pollen is moved from the male anther of a flower to the female stigma.
pollinator	Animals or insects which carry pollen between plants.
germination	When a seed starts to grow.

Lower Key Stage 2

Vocabulary	Definition
Animals including humans i	
mouth	The body opening through which an animal takes in food.
oesophagus	the tube in the body that takes food from the mouth to the stomach.
small intestine	The upper part of the bowels between the stomach and the large intestine.
large intestine	The lower part of the bowels in which water is removed from digested food before it is passed out of the body as solid waste.
rectum	The lowest end of the bowels down which solid waste travels before leaving the body through the anus.
anus	The opening at the end of the alimentary canal through which solid waste leaves the body.
digestive system	The organs in your body involved with the digestion of food.
food chain	A series of living things that are connected because each group of things eats the group below it in the chain.
Animals including humans ii	
photosynthesis	The process by which green plants use sunlight, carbon dioxide and water to make nutrients.
carnivore	An animal that eats only animals.
herbivore	An animal that eats only plants.
omnivore	An animal that eats plants and animals.
skeleton	An internal or external framework of bone, cartilage, or other rigid material supporting or containing the body of an animal.
muscle	Fibrous tissue in a body that has the ability to contract, producing movement.
States of matter	
solid	A solid retains its own shape. It is rigid and has a fixed volume.
liquid	A liquid fits the shape of the container it's in. Liquids are not rigid and can be poured.

Lower Key Stage 2

Vocabulary	Definition
gas	Fills all the available space and can be compressed.
evaporation	The process of heating water, or another liquid, so it turns into a gas.
condensation	The process of cooling water vapour (steam), or another gas, so it turns into a liquid.
water cycle	The water cycle shows the continuous movement of water within the Earth.
Rocks	
sedimentary rock	Rocks formed by sediment that is deposited over time, usually as layers at the bottom of lakes and oceans.
igneous rock	Rock formed when magma cools and solidifies, it may do this above or below the Earth's surface.
metamorphic rock	Rocks that have been changed over time by extreme pressure and heat.
permeable	Allowing liquid or gas to pass through it.
fossil	The remains or impression of a prehistoric plant or animal embedded in rock and preserved in stone form.
palaeontologist	A person who studies fossil plants and animals.
soil	A black or dark brown material typically consisting of a mixture of organic remains, clay, and rock particles.
loam	A fertile soil of clay and sand containing humus.
Living things and their habitat	
vertebrate	An animal with a backbone.
invertebrate	An animal without a backbone.
deciduous	A tree that sheds its leaves in winter.
classification	Arranging plants and animals into groups according to their similarities.
habitat	The natural home of an animal, plant or other organism.
food chain	A series of organisms, each dependent on the next as a source of food.
food web	A series of interlocking food chains.

Lower Key Stage 2

Vocabulary	Definition
Sound	
sound	Vibrations that travel through the air or other matter and can be heard when they reach a person's or animal's ear.
loudness	The production of much noise.
pitch	How low or high a sound is.
vibration	Rapid back and forth movement.
vacuum	A space devoid of any matter.
devoid	Entirely lacking or free from.

11.6

Upper Key Stage 2

Vocabulary	Definition
Working scientifically	
continuous data	Data which can take any values. Examples include time, height and weight.
discrete Data	Data that can only take certain values. E.g. the number of children in a class.
enquiry	A question, an investigation or the process of seeking information.
variable	Something that changes or can be changed.
controlled Variables	The things in an investigation that are kept the same.
dependent Variable	The think that is being measured in an investigation.
independent Variable	The one thing you change in an investigation.
conclusion	A summary of an investigation.
Electricity	
components	A component is any device in an electric circuit that transfers electrical energy into another form.
conductor	A material or device that conducts or transmits heat or electricity.
current	The flow of electrons in a circuit is known as a current.
electrons	Electrons are small particles with a negative electric charge.
insulator	Any material that keeps energy such as electricity, heat, or cold from easily transferring through is an insulator.
resistance	A measure of the degree to which a substance impedes the flow of electric current induced by voltage.
volts	Volts and Watts are both related to energy transfers in an electric circuit. The voltage of a power supply is a measure of the energy it gives.
amp (ampere)	Unit of electrical current.
cell	A device that changes chemical energy into electrical energy.

Upper Key Stage 2

Vocabulary	Definition
Evolution and inheritance	
adaptation	The process of change by which an organism or species becomes better suited to its environment.
evolution	The process by which different kinds of living organisms are believed to have developed from earlier forms during the history of the Earth.
fossil	The remains or impression of a prehistoric plant or animal embedded in rock and preserved in petrified form.
generation	A set of members of a family regarded as a single step or stage in descent.
inherit	Derive (a quality, characteristic, or predisposition) genetically from one's parents or ancestors.
palaeontology	The branch of science concerned with fossil animals and plants.
theory	A system of ideas intended to explain something.
Animals including humans i	
arteries	Tubes in your body that carry oxygenated blood from your heart to the rest of your body.
blood vessels	The tube-like structures that carry blood through the tissues and organs. Veins, arteries and capillaries are the three types of blood vessels.
capillaries	Capillaries are very tiny blood vessels — so small that a single red blood cell can barely fit through them. They connect your arteries and veins.
circulatory system	A system which includes the heart, veins, arteries and blood transporting substances around the body.
deoxygenated blood	Deoxygenated blood is blood where most of the oxygen has already been transferred to the rest of the body.
nutrients	Substances that help animals and plants grow.
oxygenated blood	Oxygenated blood has more oxygen. It is pumped from the heart to the rest of the body.
veins	A tube in your body that carries deoxygenated blood to your heart from the rest of your body.
Living things and their habitats i	
vertebrate	Animals that have a backbone.

Upper Key Stage 2

Vocabulary	Definition
characteristics	Special qualities or appearances that make an individual or group of things different to others.
classify	To sort things into different groups.
taxonomist	A scientist who classifies different living things into categories.
key	A key is a series of questions about the characteristics of living things. A key is used to identify a living thing or decide which group it belongs to.
bacteria	A single-celled microorganism.
micro-organism	An organism that can only be seen using a microscope, e.g. bacteria, mould and yeast.
species	A group of animals that can reproduce to produce fertile offspring.
Light	
light	A form of energy that travels in a wave from a source.
light source	An object that makes its own light.
reflection	When light bounces off a surface, changing the direction of a ray of light.
refraction	When light bends as it passes from one medium to another. E.g. Light bends when it moves from air into water.
incident ray	A ray of light that hits a surface.
reflected ray	A ray of light that has bounced back after hitting a surface.
prism	A prism is a solid 3D shape with flat sides. The two ends are an equal shape and size. A transparent prism separates out visible light into all the colours.
transparent	Describes objects that let light travel through them easily, meaning you can see through the object.
translucent	Describes objects that things let some light through, but scatters the light so we can't see through them properly.
spectrum	A band of colours.
rainbow	An arch of visible colours in the sky.

Upper Key Stage 2

Vocabulary	Definition
Forces	
gravity	The force that attracts a body towards the centre of the Earth.
friction	The resistance that one surface or object encounters when moving over another.
upthrust	The upward force that a liquid exerts on an object floating in it.
air resistance	A type of friction between air and another material.
water resistance	A type of force that uses friction to slow things down that are moving through water.
gears	A rotating part in a machine it has teeth cut around its edge.
pulleys	A wheel with a groove through which a string runs.
levers	A rigid bar resting on a pivot, used to move a heavy or firmly fixed load with one end when pressure is applied to the other.
Animals including humans ii	
gestation	The process in which babies grow inside their mother's body before they are born.
gestation Period	The time during which an embryo develops inside their mothers' body.
embryo	An unborn or unhatched offspring in the process of development.
foetus	An offspring of a human or other mammal before it is born that follows the embryo stage.
fertilisation	The process of causing an egg or seed to start to develop into a new young animal or plant by joining it with a male cell.
species	A set of animals or plants in which the members have similar characteristics to each other and can breed with each other.
adolescent	A young person in the process of developing from a child into an adult.
toddler	A young child who is just beginning to walk.
womb	A muscular bag with a soft lining where a baby develops until its birth.

Upper Key Stage 2

Vocabulary	Definition
Earth and Space	
axis	An imaginary line about which the Earth rotates.
rotate	Move in a circle round an axis or centre.
orbit	The curved path of an object round a star, planet, or moon.
solar	Describes something that is related to the Sun.
Solar system	Consists of the Sun and everything that orbits it such as the planets, moons, and asteroids.
lunar	Describes something that is related to the Moon.
spherical	Having the form of a sphere
waxing	The time period when the new Moon begins its orbit and we see more and more of the Moon, this is called waxing.
waning	The time period after a full Moon when we start to see less and less of the Moon.
Properties and changes of materials	
hardness	The quality of being difficult to bend, cut, or break.
solubility	The ability to be dissolves, especially in water.
transparent	Allowing light to pass through so that objects behind can be distinctly seen.
conductivity	The degree to which a material conducts electricity.
magnetic	Capable of being attracted by a magnet or taking on the characteristics of a magnet.
filter	A device that removes unwanted particles from a liquid or gas.
evaporation	The process of turning from liquid into a gas.
dissolving	To cause a solid to become incorporated into a liquid so as to form a solution.

Upper Key Stage 2

Vocabulary	Definition
Living things and habitats ii	
mammal	A warm-blooded animal that has hair or fur. The females secretes milk for the nourishment of the young, and (typically) gives birth to live young.
reproduction	The production of offspring.
insect	A small invertebrate that has six legs and generally one or two pairs of wings
amphibian	A cold-blooded vertebrate that has gill-breathing young and lung breathing adults.
bird	A warm-blooded egg-laying vertebrate that has feathers, wings, a beak, and typically is able to fly.
offspring	An animal's young.