United Learning

Science Curriculum

Overview: Whole School

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Autumn 1	**Biology** Plants *Identifying and naming common plants and describing basic structures*	**Biology** Plants *Plants grow from seeds, and require water, light and a suitable temperature*	**Chemistry** Rocks *Comparisons of types of rocks and how fossils are formed*	**Biology** Living things & their environment *Introduction to classifying animals and their environment*	**Chemistry** Properties of materials *Relationship between materials and their uses; difference between reversible and non-reversible changes*	**Biology** Evolution and inheritance *Fossils; introduction to the idea that adaptation may lead to evolution*
Autumn 2	**Biology / Physics** Seasonal changes *Observing changes across four seasons and describing associated weather*	**Biology** Needs of animals *Animals need water, food and air to survive and to have offspring*	**Physics** Light *Relationship between light and how we see; the formation of shadows*	**Biology** Digestion *The human digestive system and simple food chains*		**Physics** Electricity *Investigating variations in series circuits*
Spring 1	**Chemistry** Everyday materials *Distinguishing objects from the material it's made from, and describing simple properties*	**Biology** Living things & their habitats *Basic introduction to habitats and micro-habitats, and simple food chains*	**Biology** Living organisms *The role of muscles and skeletons; the importance of nutrients*	**Chemistry** States of matter *Solids, liquids and gases and the role of temperature in changing states*	**Biology** Life cycle *Life cycles of a mammal, amphibian, insect and bird, and some reproduction processes*	**Physics** Light *How light travels and is reflected, and how this allows us to see*
Spring 2		**Chemistry** TBC ***[Coming for 2020/21]***	**Biology** Plants *The key features of flowering plants and what they need to survive*	**Physics** Sounds *Relationship between strength of vibrations and volume of sound*	**Biology** Human development *Human development to old age*	**Biology** Classifying living things *Further classification of living organisms based on characteristics*
Summer 1	**Biology** Animals *Identifying and naming fish, amphibians, reptiles, birds and mammals; recognising carnivores, herbivores and omnivores*	**Chemistry** Uses of everyday materials *Comparisons of an object's material with its use; impact of bending, twisting etc. on solid objects*	**Physics** Forces & magnets *Magnets have poles which attract or repel*	**Physics** Electricity *Simple series circuits*	**Physics** Forces *Gravity, air and water resistance and friction; introduction to pulleys*	**Biology** Functions of the human body *Human circulatory system; transport of nutrients within the body*
Summer 2				**Chemistry** TBC ***[Coming for 2020/21]***	**Physics** Earth and space *Movements of planets and the Moon, and relationship to day and night*	**Chemistry** Chemical reactions *Reactions of substances with water, fire and acid*

Overview: Year 1

	Substantive knowledge		Disciplinary knowledge	
Autumn	**Biology** *Plants*	• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees, e.g. five examples of each from the school's locality. • Identify and describe the basic structure of a variety of common flowering plants, including trees, and name parts, e.g. leaves, flowers, roots, stem/trunk.	Scientific Attitudes & Planning Measuring & Observing Recording & Presenting Analysing & Evaluating	**Scientific Attitudes & Planning** • Asking simple questions and recognising that they can be answered in different ways **Measuring & Observing** • Observing closely using simple equipment • Performing simple tests **Recording & Presenting** • Gathering and recording data to help in answering questions • Identifying and classifying **Analysing & Evaluating** • Use their observations and ideas to suggest answers to questions
	Biology / Physics *Seasonal changes*	• Observe and describe changes across four seasons. • Observe and describe the weather and how it varies. • Observe and describe how the length of the day changes at different times of the year.		
Spring	**Chemistry** *Everyday materials*	• Identify a variety of common materials and objects made from them. • Identify and name a variety of everyday materials (e.g. wood, metal, glass, paper, water, rock). • Use simple language to describe the physical properties of materials (e.g. hard, soft, rough, smooth, shiny, dull). • Use the physical properties of materials to compare and group them.		
Summer	**Biology** *Animals*	• Identify and name a variety of common animals that they have seen. • Compare first-hand the similarities and differences of different animals. • Group familiar animals according to what they eat. • Describe and compare features of a variety of common animals (fin, wing, claw, scales, feather etc.) • Name and locate simple parts of the human body, including those related to the senses.		

Overview: Year 2

	Substantive knowledge		Disciplinary knowledge	
Autumn	**Biology** *Plants*	• Observe and describe how seeds and bulbs grow into mature plants. • Recognise that water, light and a suitable temperature are needed for survival and growth.	Scientific Attitudes & Planning	**Scientific Attitudes & Planning** • Asking simple questions and recognising that they can be answered in different ways
	Biology *Needs of animals*	• Describe the main changes that occur as young animals, including humans, grow into adults. • Describe the basic needs of animals, including humans, for survival. • Describe the importance of exercise, a balanced diet and hygiene for humans.		
Spring	**Chemistry** *TBC*	• TBC	Measuring & Observing	**Measuring & Observing** • Observing closely using simple equipment • Performing simple tests
	Biology *Living things and their habitats*	• Identify, with reasons, things that are alive, dead, or never been alive. • Describe the survival needs of animals including humans, and recognise that animals and plants usually live in habitats that are suited to them. • Describe how plants and animals depend on each other (food chains). • Identify and name a variety of plants and animals that they have seen or experienced in their habitats, including microhabitats (e.g. under log). • Describe how animals get their food from other animals or plants • Use simple food chains to describe feeding relationships.	Recording & Presenting	**Recording & Presenting** • Gathering and recording data to help in answering questions • Identifying and classifying
			Analysing & Evaluating	**Analysing & Evaluating** • Use their observations and ideas to suggest answers to questions
Summer	**Chemistry** *Uses of everyday materials*	• Identify and compare the properties of everyday materials, to assess their suitability for particular purposes. • Investigate how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.		

Overview: Year 3

	Substantive knowledge		Disciplinary knowledge	
Autumn	**Chemistry** *Rocks*	• Compare and group rocks in different ways according to their properties. • Describe how fossils are formed. • Explain, in simple terms, that soils are made when rocks are weathered and break down into small particles that combine with organic matter to make soil.	Measuring & Observing Recording & Presenting	**Activity**: Observing, comparing and identifying different types of rock. **Measuring & Observing** • Make qualitative, systematic observations about rocks. **Recording & Presenting** • Present the properties of rocks (hardness and permeability) in a Carroll diagram.
	Physics *Light*	• Explain that we need light in order to see, and that darkness is its absence. • Explain that we see objects because light is reflected from their surface. • Explain that shadows are formed when light from a source is blocked by an opaque object and that the position and shape of a shadow can vary.	Measuring & Observing Analysing & Evaluating	**Activity**: Exploring how the position of the light source affects the size and shape of a shadow. **Measuring & Observing** • Make accurate measurements using a ruler. **Analysing & Evaluating** • Identify patterns and draw simple conclusions.
Spring	**Biology** *Living organisms*	• Describe the nutritional needs of animals, including humans, showing knowledge of simple food groups (e.g. dairy, vegetables) in a healthy diet. • Name, locate and describe functions of main parts of the musculoskeletal system (e.g. skull, spine, ribs) in humans and in other animals. • Identify which parts protect, support or are involved in movement.	Analysing & Evaluating	**Activity**: Grouping and comparing features of animals with/without a skeleton. **Analysing & Evaluating** • Identify patterns, similarities and differences and use these to draw conclusions. • Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
	Biology *Plants*	• Name, locate main and describe functions of the main features of plants, and how water is transported within plants. • Describe basic requirements of plants for life and growth (e.g. light, water) • Give relevant examples of different plants with contrasting requirements. • Name simple parts of a flower and describe their function. • Describe the role flowers play in the life cycle of the plant.	Scientific Attitudes & Planning Analysing & Evaluating	**Activity**: Exploring the impact that different conditions has on plant growth. **Scientific Attitudes & Planning** • Ask relevant questions and set up an experiment with controlled variables. **Analysing & Evaluating** • Draw conclusions and suggest ways of improving the comparative test.
Summer	**Physics** *Forces & magnets*	• Describe and compare how things move on different surfaces, and how forces like friction affect this. • Describe how magnetic forces can act at a distance and in different ways. • Identify that some materials are magnetic while others are not. • Understand that not all metals are magnetic.	Measuring & Observing Analysing & Evaluating	**Activity**: Investigating whether materials are magnetic or not. **Measuring & Observing** • Make systematic observations. **Analysing & Evaluating** • Identify patterns, draw simple conclusions and use these to make predictions about the magnetism of other materials.

Overview: Year 4

	Substantive knowledge		Disciplinary knowledge	
Autumn	**Biology** *Living things and their environment*	• Group, classify and identify animals and plants found locally and during field study trips, into broad groups practically, using keys or in other ways. • Explain how environmental changes may have an impact on living things, e.g. the effects of pollution, littering or building work.	Measuring & Observing Analysing & Evaluating	**Activity**: Making simple classification keys to identify local plants and animals **Measuring & Observing** • Identifying characteristics of animals or plants that can be used in the classification key. **Analysing & Evaluating** • Evaluating the classification key based on ease of use, clarity of questions used on the key. • Explain why one classification key may look different to another when both are identifying the same plants/animals.
	Biology *Food and digestion*	• Construct and interpret food chains, labelling producer, predator, prey. • Name, locate and describe the functions of the main parts of the digestive system, i.e. mouth, tongue, teeth, oesophagus, stomach, small intestine, large intestine, in humans. • Identify different types of teeth in humans, e.g. molar, canine and incisor, and describe their functions.	Attitudes & Planning Recording & Presenting Analysing & Evaluating	**Activity**: Investigating the how animals' teeth differ based on their diet. ~~**Scientific Attitudes & Planning**~~ • ~~Ask scientifically relevant questions and identify a range of test animals~~. **Recording & Presenting** • Record and present information in an accurate, labelled diagram. **Analysing & Evaluating** • Draw conclusions about an animal's teeth and its diet.
Spring	**Chemistry** *States of matter*	• Group solids/liquids/gases based on their properties. • Describe how a variety of materials change state when they are heated or cooled. • Describe the water cycle and the part played by evaporation and condensation within that process.	Measuring & Observing Recording & Presenting Analysing & Evaluating	**Activity**: Investigating how different chocolates melt at a certain temperature. **Measuring & Observing** • Make accurate measurements of temperature using a thermometer. **Recording & Presenting** • Design and use a table to record results. **Analysing & Evaluating** • Produce an oral or written report or presentation of the investigation.
	Physics *Sounds*	• Use the idea that sounds are associated with vibrations, and that they require a medium, i.e. a solid, liquid or gas, to travel through, to explain how sounds are made and heard. • Describe the relationship between the pitch of a sound and the features of the object that produced it, and between the volume of a sound, the strength of the vibrations and the distance from a sound source.	Recording & Presenting Analysing & Evaluating	**Activity**: Investigating the pitch and volume of sounds using rulers and drums. **Recording & Presenting** • Design and use a table to record results. **Analysing & Evaluating** • Identify patterns, similarities and differences and make predictions about future results. • Evaluate the investigation and suggest improvements.
Summer	**Physics** *Electricity*	• Name a variety of appliances that run on mains and/or battery power. • Use simple apparatus to construct and control the flow of electricity in a series circuit. • Describe how the circuit may be affected when changes are made to it. • Name common conductors (such as metals and water) and insulators (such as wood, plastic), and, given information about how an unknown material behaves in a circuit, classify it as a conductor or insulator.	Attitudes & Planning Analysing & Evaluating	**Activity**: Investigating conductors and insulators in a series circuit. **Scientific Attitudes & Planning** • Ask scientifically relevant questions and identify controlled variables. **Analysing & Evaluating** • Identify patterns and use these to draw conclusions and make predictions. • Suggest next steps to answer further scientific questions.
	Chemistry *TBC*	• **TBC – Coming for 2020/21**	TBC	• TBC

Overview: Year 5

	Substantive knowledge		Disciplinary knowledge	
Autumn	**Chemistry** *Properties of materials*	• Observe properties of everyday materials and group in different ways. • Explain what happens when dissolving occurs in everyday situations. • Describe processes to separate mixtures and solutions (solid dissolved in liquid) into their component materials. • Give reasons for the use of everyday materials for different purposes, based on their properties. • Identify, with reasons, whether changes in materials are reversible or not.	Attitudes & Planning Analysing & Evaluating	**Activity**: Investigating techniques to separate mixtures (magnet, filter etc.). ~~**Attitudes & Planning**~~ ~~• Set up scientific enquiries with controlled variables.~~ **Analysing & Evaluating** • Reporting the enquiry, identifying further scientific evidence to support their findings. • Use test results to make predictions about further investigations.
Spring	**Biology** *Life cycle*	• Describe and compare different life cycles in some specific types of animals and plants, e.g. bat or hedgehog, newt, bumblebee, peregrine falcon. • Describe and compare different reproductive processes in some animals and plants, including asexual (e.g. taking cuttings) and sexual reproduction in plants and sexual reproduction in humans and other animals.	Attitudes & Planning Analysing & Evaluating	**Activity**: Researching and presenting life cycles of different organisms. **Attitudes & Planning** • Ask relevant questions and set up scientific enquiry with variables. **Analysing & Evaluating** • Identifying patterns and reporting the enquiry in an oral or written presentation.
	Biology *Human development*	• Describe the main changes as humans grow into adults and develop to old age, i.e. baby, child, adolescent, adult, old person.	Recording & Presenting Analysing & Evaluating	**Activity**: Investigating the relationship between size and gestation periods. **Recording & Presenting** • Record data and present results with a scatter graph. **Analysing & Evaluating** • Draw conclusions and explain causal relationships. • Identify further scientific evidence to support findings and make predictions.
Summer	**Physics** *Forces*	• Describe the effects of simple forces that involve contact (air and water resistance, friction), and gravity. • Identify simple mechanisms, including levers, gears and pulleys that allow a smaller force to have greater effect.	Measuring & Observing Recording & Presenting Analysing & Evaluating	**Activity**: Investigating air resistance and water resistance using parachutes. **Measuring & Observing** • Measure accurately using a ruler and stopwatch; take repeat readings. **Recording & Presenting** • Set up a table to record results, and present these using a bar chart. **Analysing & Evaluating** • Draw conclusions and explain relationships; evaluate investigation.
	Physics *Earth and space*	• Describe the shapes and relative movements of the Sun, Moon, Earth and other planets in the solar system. • Explain the apparent movement of the sun across the sky in terms of the earth's rotation and that this results in day and night.	Measuring & Observing Recording & Presenting	**Activity**: Investigating the monthly temperature and daylight hours in UK and country in the southern hemisphere (e.g. Australia). **Measuring & Observing** • Researching using the internet.. **Recording & Presenting** • Presenting findings using a bar chart and line graph.

Overview: Year 6

	Substantive knowledge		Disciplinary knowledge	
Autumn	**Biology** *Evolution & inheritance*	• Describe how fossils provide evidence for evolution. • Use the basic ideas of inheritance, variation and adaptation to describe how living things have changed over time and evolved.	Attitudes & Planning Analysing & Evaluating	**Activity**: Investigating adaptations of various organisms. **Attitudes & Planning** • Ask relevant questions and define the parameters for scientific enquiry. **Analysing & Evaluating** • Explain causal relationships in a written or oral report; make predictions.
	Physics *Electricity*	• Use apparatus to construct and control a circuit, and describe how the circuit may be affected when changes are made to it. • Use recognised symbols to represent simple series circuit diagrams.	Measuring & Observing Recording & Presenting	**Activity**: Investigating the effect of wire length on the brightness of bulbs. **Measuring & Observing** • Use apparatus to construct and control a circuit, and describe how the circuit may be affected when changes are made to it. **Analysing & Evaluating** • Explain causal relationships in a written or oral presentation.
Spring	**Physics** *Light*	• Use the idea that light from light sources, or reflected light, travels in straight lines and enters our eyes, to explain how we see objects. • Use the idea that light travels in straight lines to explain the formation, shape and size of shadows.	Recording & Presenting Analysing & Evaluating	**Activity**: Designing and making a periscope. **Recording & Presenting** • Create accurate, scientific diagrams to illustrate findings. **Analysing & Evaluating** • Report findings and identify wider applications for the scientific principle.
	Biology *Classifying living things*	• Explain how observable features, similarities and differences between types of plants, animals and micro-organisms are used to group and classify them, and give reasons why this is useful.	Attitudes & Planning Analysing & Evaluating	**Activity**: Designing and using own classification keys. **Scientific attitudes and planning** • Identify variables and design appropriate questions for classification key. **Analysing & Evaluating** • Evaluate the reliability of their classification key, and recognise limitations.
Summer	**Biology** *Functions of the human body*	• Name, locate and describe the functions of the main parts of the circulatory system, i.e. heart, blood vessels and blood. • Describe the effects of diet, exercise, drugs and lifestyle on how the human body functions.	Measuring & Observing Recording & Presenting	**Activity**: Investigating the effects of exercise on heart rate. **Measuring & Observing** • Making accurate measurements and repeat readings when required. **Recording & Presenting** • Presenting results using a scatter graph, and making conclusions from this.
	Chemistry *Chemical reactions*	• Identify, with reasons, whether changes in materials are reversible or not. • Recognise when a chemical reaction has taken place (e.g. colour change; production of an odour; change in temperature; release of gas or formation of a solid).	Planning Measuring & Observing	**Activity**: Identifying when a chemical reaction has taken place. **Attitudes & Planning** • Set up a scientific enquiry with dependent and independent variables. **Measuring & Observing** • Make systematic observations and measurements using thermometer.