Keevil CofE Academy Science Curriculum

"We presume children to achieve their very best."

Keevil CofE Academy Mission Statement

We know that for children to achieve their best our curriculum needs to be designed in order to enable the maximum amount of learning, through the recall and understanding of knowledge and concepts. Therefore our curriculum is organised as a progression which facilitates the re-visiting of learning through recurrent themes, such that it becomes embedded in children's long term memory. We also understand the importance of children making connections between prior and new learning. The cyclical nature of our curriculum design, in which topics are returned to over the course of a child's time with us, helps to enable this.

Our rationale for the teaching of science follows that detailed in the National Curriculum:

Purpose of study

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

Aims

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

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

We ensure our Science Curriculum is rooted in the vision and ethos of the school, through ensuring that as well as delivering scientific knowledge and skills lessons also develop the Keevil Characteristics:
Children learn the knowledge that helps them understand a range of scientific processes and concepts. Problem-solving is an integral part of the scientific process, which is developed through an enquiry-based approach to learning the subject. Diligence and resilience are required to execute investigations accurately and reliably, as is team-work as experiments, tests and research need to be conducted in collaboration with others. Good communication skills are vital to present, share, discuss and explain findings and outcomes, as well as deepen understanding.

Keevil CofE Academy Science Knowledge Progression

Theme	EYFS/KS1	Lower KS2	Upper KS2
BIOLOGY			
Humans	**Humans** ▪ *Explore the natural world around them, making observations and drawing pictures of animals and plants.* ▪ 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. ▪ identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	**Humans – skeleton and muscles** ▪ identify that humans and some other animals have skeletons and muscles for support, protection and movement. **Humans – teeth and eating** ▪ 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 ▪ 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	**Humans** ▪ 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.
Plants	**Plant Diversity** ▪ *Explore the natural world around them, making observations and drawing pictures of animals and plants.* ▪ *Know some similarities and difference between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.* ▪ 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. **Growing Plants** ▪ *Explore the natural world around them, making observations and drawing pictures of animals and plants.* ▪ 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.	**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.	
Living Things	**Living Things – Animals** ▪ *Explore the natural world around them, making observations and drawing pictures of animals and plants.* ▪ *Know some similarities and difference between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.* ▪ identify and name a variety of common 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) ▪ notice that animals, including humans, have offspring which grow into adults	**Classification and 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. ▪ construct and interpret a variety of food chains, identifying producers, predators and prey.	**Living things and their habitats** **Inc. classification, life processes, reproduction and adaptation** ▪ 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 the changes as humans develop to old age. ▪ 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.

	Habitats ▪ *Explore the natural world around them, making observations and drawing pictures of animals and plants.* ▪ *Know some similarities and difference between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.* ▪ 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.		
Evolution		**Evolution** ▪ describe in simple terms how fossils are formed when things that have lived are trapped within rock ▪ recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago	**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.

PHYSICS

Forces

Forces

- *Understand some important processes and changes in the natural world around them.*
- observe, describe and compare movements they make and movements of objects in terms of speed or direction
- describe how to make a familiar object start moving by pushing or pulling
- recognise dangers to themselves in moving objects
- describe how to use pushes and pulls to make familiar objects speed up, slow down, or change direction or shape
- recognise that pushes and pulls are forces
- plan a comparison and decide whether it was fair
- make measurements of length using standard units and present these in a chart

Magnets

- 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.

Forces and Friction

- compare how things move on different surfaces
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces

Forces and Friction

- 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.

Electricity

Electricity

- *Understand some important processes and changes in the natural world around them.*
- identify common appliances which use electricity
- describe the dangers associated with mains electricity
- construct and make drawings of simple working circuits and explain why some circuits work and others do not

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.

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.

Light and Sound

Light and Sound

- *Understand some important processes and changes in the natural world around them.*
- name a number of light sources, including the Sun
- recognise that they cannot see in the dark
- describe and compare some light sources and explain why it is dangerous to look at the Sun
- recognise and describe many sounds
- describe how sounds are generated by specific objects
- state that they hear sounds through their ears
- describe what they observe when they move further away from a source of sound
- make observations or measurements relating to sounds and with help present these in charts

Light and Sound

- 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 size of shadows change.
- 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.

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.

Earth and Space	**Seasonal Change** ▪ *Understand some important processes and changes in the natural world around them, including the seasons.* ▪ observe changes across the four seasons ▪ observe and describe weather associated with the seasons and how day length varies.		**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.

CHEMISTRY

Materials

Everyday Materials

- *Understand some important processes and changes in the natural world around them.*
- 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 Materials

- *Understand some important processes and changes in the natural world around them.*
- 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.

Changing Materials

- *Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.*
- identify some naturally occurring materials
- predict and describe how heating can change some materials into new and useful materials and state the dangers of hot water or naked flame
- describe what happens to water when it is heated and cooled
- record observations in tables and recognise when simple comparisons are unfair

Rocks

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- recognise that soils are made from rocks and organic matter.

Materials

- 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.

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.

Keevil CofE Academy Science Skills Progression

Theme	EYFS/KS1	Lower KS2	Upper KS2
Asking Questions	Pupils should be taught to: • Ask simple questions and recognise that they can be answered in different ways.	Pupils should be taught to: • Ask relevant questions and use different types of scientific enquiries to answer them. • Set up simple practical enquiries, comparative and fair tests.	Pupils should be taught to: • Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. • Talk about how scientific ideas have developed over time.
Measuring and Recording	Pupils should be taught to: • Observe closely, using simple equipment • Perform simple tests. • Gather and record data to help in answering questions.	Pupils should be taught to: • Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. • Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • Gather, record, classify and present data in a variety of ways to help in answering questions • Talk about criteria for grouping, sorting and classifying; and use simple keys	Pupils should be taught to: • 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 and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment.
Concluding	Pupils should be taught to: • Identify and classify • Use their observations and ideas to suggest answers to questions • Ask people questions and use simple secondary sources to find answers. • With guidance, they should begin to notice patterns and relationships. • With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language	Pupils should be taught to: • Identify differences, similarities or changes related to simple scientific ideas and processes. • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • Use straightforward scientific evidence to answer questions or to support their findings. • Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. • Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. • Use relevant simple scientific language to discuss their ideas and communicate their findings.	Pupils should be taught to: • Identify scientific evidence that has been used to support or refute ideas or arguments. • Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. • Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. • Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas.
Evaluating		Pupils should be taught to: • Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.	Pupils should be taught to: • Use test results to make predictions to set up further comparative and fair tests.