

## Curriculum Intent and Vision Statement:

Our vision in Science is to encourage curiosity in children, so that they ask questions that fuel explorations and investigations about the universe in which we live. Throughout the school, Science is a practical, interactive, hands-on subject, which develops the skills and processes of scientific enquiry, as well as understanding about the concepts being explored. The children systematically build a bank of scientific vocabulary, which supports their acquisition of scientific knowledge and enables them to effectively describe and explain the concepts they are learning about. The children's scientific knowledge of the world is deepened further by exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments.

The topics taught will link directly to the National Curriculum Science Key Stage 2 programme of study. They will build on the learning and experiences that the children have gained whilst at Shottermill Infant School and will develop scientific knowledge and conceptual understanding of the specific disciplines of biology, chemistry and physics studied at secondary level. Our science curriculum ensures that children:

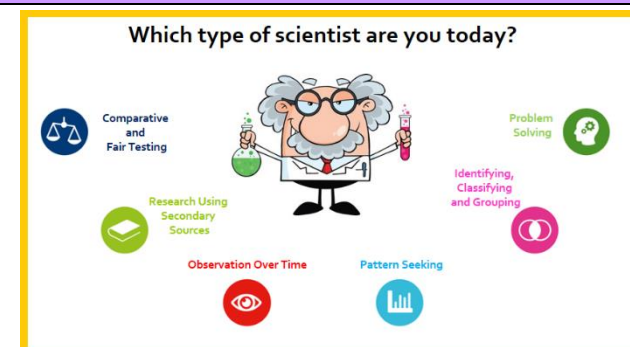
- Develop a deep and lasting interest in Science, to understand the uses and implications of Science, today and for the future, thus becoming motivated to study it further;
- Are prepared for life in an increasingly scientific and technological world;
- Show concern about, and appreciate, our environment (complemented by being an ECO-School) and will explore ways in which we can all participate to building a sustainable planet and a healthy lifestyle for the future;
- Apply scientific vocabulary to describe and explain the world around them;
- Are able to utilise the school environment and local area, make links to the broader curriculum, and their life experiences;
- Are confident to lead their own learning, carrying out and planning fair investigations to provide answers to their own questions;
- Are encouraged to continue developing their love of Science in their home life with homework tasks.

## Implementation of Science at our school:

All children will be taught at least 1 hour of Science a week, although some lessons may be blocked from time to time to allow for children to study in greater depth or for activities such as investigations, which may take longer to complete. There are extra opportunities for Science research and investigations on the half-termly homework grids in each year group.

Links will be made through other subjects, such as PE, where all year groups will study health related fitness. In Maths, children will learn about measuring scientifically, making predictions and how to make accurate observations. We also utilise the outdoor environment, including our woodlands and school pond to enhance the 'Living things and their habitats' and 'Humans and other animals' topics.

Children are also encouraged to consider the question '*What type of scientist are you today?*' at the start and end of their lesson, as this links to the 6 types of Scientific Enquiry and the Working Scientifically aspect of the National Curriculum.



## The following educational trips and special activities will enhance the teaching and learning in this subject:

**Year 3:** Exploration of the outdoor environment in relation to materials, forces and life cycles.

**Year 4:** Links made with DT Night Lights project and electrical circuits. They will also explore living things in their habitats during their visit to Sayers Croft.

**Year 5:** Children will explore the solar system through a planetarium experience and Bohunt Taster Science Day.

**Year 6:** Children will have the opportunity to learn about organs, through dissection demonstration and 'Restart a Heart' first response training.

## Scheme of work to be taught:

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

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

### Year 3

#### Autumn

##### 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 (investigation for book bag material)
- 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 (investigation-baby blind)
- find patterns in the way that the size of **shadows** change (investigation- Year 6?)

##### Forces and Magnets

- compare how things move on different surfaces (investigation- forcemeter and shoe and investigation -use ramp with different surfaces)
- notice that some forces need contact between 2 objects, but magnetic forces can act at a distance (investigation the effects of different magnets-designed by children and carousel of activities)
- 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 and observe how 2 magnets will attract or repel each other, depending on which poles are facing, identifying which materials are magnetic (investigation)

Research a scientist physicians- Galileo Galilei, Isaac Newton, William Gilbert, John Philoponus

#### Spring

##### Animals including humans

### Year 4

#### Autumn

##### Animals including humans

- describe the simple functions of the basic parts of the **digestive system in humans** (make poo and demo of cup and sock, timing 10 seconds to show how long food takes from mouth to stomach)
- identify the different types of **teeth** in humans and their simple functions (hard boiled eggs in different solutions to look for damage/decay over time x 2 weeks)
- construct and interpret a variety of **food chains**, identifying producers, predators and prey

##### Sound

- identify **how sounds are made**, associating some of them with something vibrating (using different instruments to pluck, bang, shake and blow)
- 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 (make straw pan pipes and use instruments that change pitch)
- find patterns between the **volume** of a sound and the strength of the vibrations that produced it (sound proof a studio)
- recognise that sounds get fainter as the distance from the sound source increases (blindfold and alarm set, string telephones)

#### Spring

##### 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 (complete circuits)
- 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**

- 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
- understand what is meant by vertebrates and invertebrates and begin classifying bugs that children might encounter in their gardens at home through a bug hunt.

#### Plants

- identify and describe the **functions of different parts of flowering plants**: roots, stem/trunk, leaves and flowers through growing own **bean plant from seed** (watching this grow and develop over 6 weeks)
- 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 (leaf safari)
- 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** (dissect lily)

#### Summer

##### Rocks

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties (Rock walk, Pebble in my Pocket story, boiled egg or peach for earths layers,) (Investigate permeability, durability, float or sink)
- describe in simple terms how **fossils** are formed when things that have lived are trapped within rock (Mary Anning-Stone Girl Bone girl)
- recognise that **soils** are made from rocks and organic matter (soil profile, Roger Rock)

Research a scientist - William Smith, James Hutton, Florence Bascom

- recognise that a **switch opens and closes a circuit** and associate this with whether or not a lamp lights in a simple series circuit (investigation)
- recognise some common **conductors and insulators**, and associate metals with being good conductors. (investigation)

#### 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
- build on Year 3 understanding of vertebrates and invertebrates and classify pond life through pond dipping.

#### Summer

##### States of matter

- compare and group materials together, according to whether they are **solids, liquids or gases** (fizzy drink investigation)
- 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) (demo of chocolate melting and demo of ice cube with salt)
- identify the part played by **evaporation and condensation in the water cycle** and associate the rate of evaporation with temperature (evaporation investigation, marbles in trays and thermometers to link to Lord Kelvin and measure temperature) (candle demo for oxygen)

Research a scientist -Lord Kelvin, John Priestly, Daniel Fahrenheit, Anders Celcius

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

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary;
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs;
- Using test results to make predictions to set up further comparative and fair tests;
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and 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.

## Year 5

### Autumn

#### Forces

- explain that unsupported objects fall towards the Earth because of the force of **gravity** acting between the Earth and the falling object (**dropping ball demo**) Link to Newton
- identify the effects of **air resistance, water resistance and friction**, that act between moving surfaces (**build boats, parachute, design a brake pad**)
- recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

#### 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 investigation-design a lunchbox**), and response to magnets (**investigation testing properties – need magnets too and test circuits for metal conductivity**)
- 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 (separating mixtures investigation)**
- 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 (**dissolving investigation**)
- 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 (**chemical changes demo**)

### Spring

#### Earth and Space

- describe the **movement of the Earth and other planets relative to the sun** in the solar system (**predicting day and night using google maps, solar system baking**)
- 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

Research a scientist- Claude Ptolemaeus, Nicolaus Copernicus, Stephen Hawking, Neil Armstrong

### Summer

#### Living things and their habitats

- describe the differences in the **life cycles** of a mammal, an amphibian, an insect and a bird

## Year 6

### Autumn

#### Light

- recognise that **light appears to travel in straight lines (pin hole camera) (light activities outside)**
- 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-the law of reflection (**devise investigation to prove this**)
- 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 (how the eye works)
- use the idea that light travels in straight lines to explain why **shadows** have the same shape as the objects that cast them (**blocking the source investigation**)

Research scientists- Euclid, Alhazen, Ibn al-Haytham, Colin Webb

### Spring

#### Electricity

- associate the brightness of a lamp or the volume of a buzzer with the number and **voltage of cells** used in the circuit (**revise circuits from Year 4-challenge cards and design an investigation testing materials to act as electrical conductors**)
- 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 -human circuit
- 

#### Animals including humans

- identify and name the main parts of the **human circulatory system**, and describe the functions of the heart, blood vessels and blood- drama (**dissection demo**)
- recognise the impact of **diet, exercise, drugs and lifestyle** on the way their bodies function (linked with PE)
- describe the ways in which nutrients and water are transported within animals, including humans

### Summer

#### Living things and their habitats (Links with maths)

- 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

#### 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

- describe the life process of **reproduction** in some plants and animals (making new plants)

**Animals including humans (links with maths)**

- describe the changes as humans develop from birth to old age
- understand different types of reproduction in animals other than humans
- understand the changes experienced in puberty
- understand how babies grow in terms of height and weight, including reading graphs
- understand gestational periods
- bring together knowledge into a mini research project about an animal of their choice.

- 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- interview Charles Darwin