SCIENCE AT SHIPLEY

# Friendship, Faith, Future

**SCIENCE**

# Purpose of study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. All pupils should be taught scientific skills underpinned by scientific knowledge. The curriculum must ensure that key concepts and procedures are systematically developed over time. Science should be relevant and fun. Pupils should develop cognitive, social and linguistic development whilst becoming more inquisitive and interested in the world around them.

# 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.

# Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. Knowledge is built up from prior learning, linked and relevant links made explicit. Misconceptions need to be identified and addressed through planning. Pupils should be familiar with and use scientific vocabulary in spoken and written recording. They should also apply their mathematical knowledge to their understanding of science, including measuring, collecting, presenting and analysing data. Different contexts can be used to maximise their pupils’ engagement with and motivation to study science eg. outdoor learning

**Working scientifically**

Pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data. ‘Working scientifically’ will be developed further at key stages 3 and 4, once pupils have built up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.

**INTENT**

Through our science curriculum we aim to:

* ensure that teachers meet their statutory obligations with regards to the teaching of Science
* foster a positive attitude to Science as an interesting and exciting part of the curriculum
* provide inclusive teaching environments that support and challenge pupils
* promote high standard of outcomes and recording
* ensure that cross curricular opportunities are maximized and science is given a wide platform
* ensure continuity and progression is planned for
* encourage safe practice in all areas of Science
* celebrate diversity and equality in Science

Through teaching Science children are given opportunities to:

* develop their knowledge and understanding of important scientific ideas, processes and skills and relate these to everyday experiences.
* develop their ability to communicate their ideas using appropriate scientific vocabulary
* develop a curious and inquisitive approach
* collect, retrieve, present and communicate their findings to others in a variety of ways
* develop skills of observation and investigation, analysis and evaluation

**IMPLEMENTATION**

A range of teaching and learning styles are used in Science lessons such as research, investigation, exploration, collaborative work and individual work. Recapping on prior learning is a strong element as children need to build on existing knowledge and skills. The learning objective must be clear and shared with children. Vocabulary is specifically taught and used by staff and pupils. Cross curricular links are encouraged and have meaning and relevance. Science displays in each classroom are designed to encourage the children to develop enquiry skills and generate questions or share outcomes. Inclusive teaching provision is through CPD and the NASEN guidance with individual pupil IEPs influencing teaching. This is monitored by SENCO and Governors.

Teachers plan elements of scientific enquiry in each lesson. This will cover one or more areas of investigation:

* Observing changes over time
* Comparative and fair testing
* Researching using secondary resources
* Pattern seeking
* Identifying and classifying

**EYFS**

# Understanding the World The Natural World

*ELG Children at the expected level of development will:*

* 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.

During the Early Years Foundation Stage, science is taught as an integral part of the topic work covered during the year. It is delivered through a hands on and practical approach, which makes links with topics and the Characteristics of Effective Learning. Scientific aspects of the children’s work are related to the objectives set out in the Statutory Early Years Framework. Science makes a significant contribution to one of the 7 areas of learning known as Understanding of the World but is also covered in Personal, Social and Emotional development and Maths. At the end of the Foundation Stage children's level of development is assessed against the Early Learning Goals as ‘emerging’ or expected’. By the end of the Foundation Stage children are expected to know about the similarities and differences in relation to objects, materials and living things. They can make observations of animals and plants, explain why some things occur and talk about changes. They are also aware of their own personal hygiene and how to look after their bodies.

**KS1 & KS2**

# KS1 and KS2

Teachers deliver thee National Curriculum for Science. The long term plan identifies the Science topics to be taught each term to each year group across a 2 year cycle. The medium term plans identify the science objectives for the unit of work for that term. Science skills are taught continually and are identified in medium term plans. The medium term planning outlines weekly opportunities for science lessons throughout the year. This is sometimes blocked over a shorter number of weeks if necessary for the topic.

The planning is monitored by the Science Curriculum leader to ensure curriculum coverage and effective teaching and learning for all pupils.

A range of teaching and learning styles are employed in science lessons. Children may be taught in whole-class or groups depending on their age and the learning activity. Children are taught to:

* ask pertinent questions and follow lines of enquiry
* undertake experiments to support lines of enquiry
* access and handle equipment safely
* have access to research sources such as books, photographs, video clips
* value visits/visitors to lead or inspire
* develop and discuss theories, learning to question, argue and disagree well
* record their findings systematically

**Science Curriculum – Cycle A 2023-24**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Autumn** | **Spring** | **Summer** |
| **KS1** | **Living Things & Habitats**  Y2 objectives   * 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 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**  **Working scientifically**  Year 2 objectives   * 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.   **STEM project** | **Plants**  Y2 objectives   * 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**  Y2 objectives   * 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. |
| **Y3/4** | **Animals including Humans**  Y4 objectives   * 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 | **States of matter**  Y4 objectives   * 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.   **Rocks and Soils**  Y3 objectives   * 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 | **Plants**  Y3 objectives   * 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. |
| **Y5/6** | **Animals including Humans**  Y5 objectives   * describe the changes as humans develop to old age.   6 objectives   * 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 | **Electricity**  Y6 objectives   * 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**  Y6 objectives   * 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. | **Living things and Habitats**  Y6 objectives   * 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.   **Living things and Habitats**  Y5 objectives (Y5 taught discretely during SATS week)   * 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  **Healthy lifestyles – incl PSHE & RSE** |

**Science Curriculum Cycle B 2024-2025**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Autumn** | **Spring** | **Summer** |
| **KS1** | Seasonal changes  Y1 objectives   * observe changes across the 4 seasons; * observe and describe weather associated with the seasons and how day length varies.   Plants  Y1 objectives   * 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. | Everyday Materials  Y1 objectives   * 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. | Animals including Humans  Y1 objectives   * 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);   identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense |
| **Y3/4** | Electricity  Y4 objectives   * 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.   Forces & Magnets  Y3 objectives   * 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. | Sound  Y4 objectives   * 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  Y3 objectives   * 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 | Living things & Habitats  Y4 objectives   * 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.   Animals including humans  Y3 objectives   * 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. |
| **Y5/6** | Evolution and Inheritance  Y6 objectives   * 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.   STEM project – ROAR (DT link) | Earth in Space  Y5 objectives   * 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.   Properties and Changes of Materials Y5 objectives   * 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. | Forces  Y5 objectives   * 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.   Living things and Habitats  Y5 objectives (Y5 taught discretely during SATS week)   * 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.   Healthy lifestyles (PSHE & RSE) |

Each unit of work includes opportunities to work scientifically and this can be a specific lesson outcome. Within each unit, pupils are taught about scientists and inventors. Consideration is given to diversity and equality.

**IMPACT**

Children are challenged to find science in everyday activities and to ask and answer questions about the world around them. An increased number of children have chosen science as one of their most enjoyable subjects. Teachers have some knowledge of the secondary science curriculum and can inspire the next generation of scientists

Children’s outcomes are assessed against the 2014 National Curriculum learning objectives. Judgements (Towards EXS. EXs or above EXS) are made against relevant National Curriculum objectives and reported to parents annually.

A range of strategies are used to assess progress and attainment including:

* class and individual discussions
* Asking clarification questions to assess understanding, developing scientific dialogue
* Providing opportunities for explanation to assess depth of knowledge and understanding
* Marking, responding to comments, asking follow on questions
* Observing the pupils carrying out practical tasks
* Pupils’ self-evaluation of their own work or peer assessment if appropriate
* Summative assessments for example at the end of topics (Headstart, Bitesize, Quizlet)

Further evidence

Y6 pupils have a positive attitude towards science and embraced the secondary science curriculum. This is evident through transition day visits and teacher/parent commentary. Children need to be made aware of careers and study opportunities in science and made aware that they are the future generation of scientists.

West Sussex KS2 statutory moderator (June 2023) noted that writing in science books was of equal quality to that in English books. Our aim has always been to maintain high standards in English across all curriculum subjects.

# Statutory Assessment

EYFS: Children are assessed in the early learning goal Understanding of the World. Children’s outcomes are recorded as ‘Emerging’ (1) or (Expected’

(2). Whether a child has achieved a ‘Good Level of Development’ is also measured and reported.

In year 2, teachers assess children’s knowledge, skills and understanding in Science

In year 6, pupils ar+e teachers assessed in Science as part of the KS2 statutory assessment.