

Science

Our high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Through building up a body of key foundational knowledge and concepts, pupils are encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They are encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims

Our curriculum 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 encourage pupils familiarity with, and use of, technical terminology, and are helped to build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The curriculum also links to other areas of learning in the school such as mathematics, geography and history.

As a theme running throughout the whole curriculum is the notion of 'Working scientifically' i.e the understanding of the nature, processes and methods of science. This is not taught as a separate strand but is embedded within the content of biology, chemistry and physics, using the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions at an age appropriate level. This includes: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils are encouraged to seek answers to questions through collecting, analysing and presenting data.

By the end of years 5 and 6, pupils are able to use the following practical scientific methods, processes and skills:

- 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

The curriculum enables learners to use the above scientific skills to develop knowledge, skills and understanding in:

- Living things and their habitats
- Animals, including humans
- Properties and changes of materials
- Earth and space
- Forces
- Evolution and inheritance
- Light
- Electricity

Content

Key Stage 1 (Years 1 and 2)

The principal focus of the schools 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 are encouraged to be curious and ask questions about what they notice. They are 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.

The curriculum is designed to help learners to 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 is done through the use of first-hand practical experiences, but there are also opportunities to use appropriate secondary sources, such as books, photographs and videos.

Lower Key Stage 2 (Years 3 and 4)

The principal focus of the science curriculum in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They 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 are encouraged to 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.

The curriculum encourages them to draw simple conclusions and use scientific language, first, to talk about and, later, to write about what they have found out, and pupils are encouraged to read and spell

scientific vocabulary correctly and with confidence, using their growing word-reading and spelling knowledge.

Upper Key Stage 2 (Years 5 and 6)

The principal focus of the science curriculum in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They 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, the curriculum ensures that learners encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They also begin to recognise that scientific ideas change and develop over time. They are taught to 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 are able to 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, and pupils are encouraged to read, spell and pronounce scientific vocabulary correctly.

Key Stage 3 (Years 7, 8 and 9 and extension at Year 5 and 6)

The principal focus of the science curriculum 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 are encouraged to see the connections between these subject areas and become aware of some of the big ideas underpinning scientific knowledge and understanding. Examples of these big ideas used in the curriculum are the links between structure and function in living organisms, the particulate model as the key to understanding the properties and interactions of matter in all its forms, and the resources and means of transfer of energy as key determinants of all of these interactions. They are 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.

The curriculum enables pupils to understand that science is about working objectively, modifying explanations to take account of new evidence and ideas and subjecting results to peer review. Pupils will increasingly 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 are supported to evaluate their results and identify further questions arising from them and develop their use of scientific vocabulary, including the use of scientific nomenclature and units and mathematical representations.

The above is delivered through a curriculum that covers the following areas:

Biology

- Cells and organisation
- The skeletal and muscular systems

- Nutrition and digestion
- Gas exchange systems
- Reproduction
- Health
- Material cycles and energy
- Photosynthesis
- Cellular respiration
- Interactions and interdependencies
- Relationships in an ecosystem
- Genetics and evolution
- Inheritance, chromosomes, DNA and genes

Chemistry

- The particulate nature of matter
- Atoms, elements and compounds
- Pure and impure substances
- Chemical reactions
- Energetics
- The periodic table
- Materials
- Earth and atmosphere

Physics

Energy

- Calculation of fuel uses and costs in the domestic context
- Energy changes and transfers
- Changes in systems
- Motion and forces
- Describing motion
- Forces
- Pressure in fluids
- Balanced forces
- Forces and motion
- Waves
- Observed waves
- Sound waves
- Energy and waves
- Light waves
- Electricity and electromagnetism
- Static electricity
- Magnetism
- Matter
- Physical changes
- Particle model
- Energy in matter

- Space physics