

Curriculum Purpose & Rationale

Science





Curriculum Purpose: Why study Science at Kings?

Why do students at Ark Kings need to study Science?

Pupils in our community often see Science as a subject that is too challenging for them to access or a subject that is very much based on history. By studying Science at our school, pupils will understand that Science is a subject about awe, wonder, curiosity and experimentation. Pupils will be inspired to consider problems or unknowns and then investigate resolutions and answers.

Additionally, pupils today are growing up in a world where there is a STEM skills shortfall. We have a duty to prepare the next generation for jobs that are required to ensure our country and economy thrive.

What are the aims for the Science curriculum?

(i.e. What do we want students to be able to know and do by the time they leave Ark Kings Primary?)

· For pupils to have a secure understanding of the four domains of Science: Physics, Chemistry, Biology and Earth Science.

Physics

P1: The universe follows unbreakable rules that are all about forces, matter and energy.

P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe.

P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.

Chemistry

C1: All matter (stuff) in the universe is made up of tiny building blocks.

C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).

C3: Matter can change if the arrangement of these building blocks changes.

Biology

B1: Living things are special collections of matter that make copies of themselves, use energy and grow.

B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago.

B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.

Earth science

E1: The Earth is one of eight planets that orbit the sun.

E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.

E3: The Earth is made up of several layers, including a relatively thin rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)

- To recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena
- To understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes
- To build a knowledge of scientific vocabulary, which aids their knowledge and understanding not only of the topic they are studying, but of the world around them
- To make sense of the world in which we live through investigation
- To explore their environment in a safe way and make connections with concepts they may take for granted

**National Curriculum:**

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.

What values underpin the curriculum content?

Appreciation: through learning about science through history, pupils appreciate the work and discoveries of individuals that have made our world a better and safer place.

Integrity: through learning about fair testing and proving hypotheses based on reliable evidence, pupils learn the value of integrity and how this brings about credibility and trust.

Responsibility: when learning about the future of science and ethical issues in the field, pupils learn how with great knowledge comes great responsibility and this needs to be channelled ethically, legally and for the right causes.

How are British Values taught through Science?

Individual liberty of own views, tolerance and mutual respect of others' views is taught through the topics where different views / ethics are involved, for example work in Upper Key Stage 2 on the theory of evolution. Pupils develop an awareness of health & safety for themselves and others when working practically.

Pupils are taught the social skills around behaviour self-regulation to ensure collective responsibility for a safe and efficient working environment. They are taught to challenge each other's behaviour or practices if they fall short of the collective expectations of the group.

What links to careers can be made within the Science curriculum?

Ecologist, Botanist, Nature conservation officer, Soil scientist, Zoologist, Veterinary surgeon, Animal technician, Biochemist, Forensic scientist, Laboratory technician, Meteorologist, Pharmacologist, Physicist, Dental nurse, Dentist, Dietician, Doctor, Midwife, Nurse, Optometrist, Paramedic, Pharmacist, Physiotherapist, Speech therapist



Curriculum Rationale: Why study Science in this way?

Why has the specific content/ domain knowledge been selected?

The core knowledge has been chosen in order to aid children's understanding of the Big Ideas of Science in Physics, Chemistry, Biology and Earth Science. Threads of scientific enquiry skills have also been selected as the drivers of delivering subject content. These include: observing over time, pattern seeking, identifying and classifying, comparative testing, fair testing and research. Across a term, pupils have the opportunity to learn subject content in different ways in order to develop their scientific enquiry skills.

Why is it taught in the order that it is?

Core knowledge is taught in a progressive way throughout Key Stages 1 and 2, with many content domains being re-visited, allowing pupils to retrieve knowledge they have previously learned and build on this in order to gain a deeper understanding of the topic and grapple with more complex ideas, as well as make their own predictions based on their existing scientific understanding.

The scientific enquiry thread of observing over time is frequently taught at the start of a half term, allowing pupils to carry out longitudinal enquiries over a unit. The remaining threads of pattern seeking, identifying and classifying, comparative testing, fair testing and research are taught regularly throughout a child's journey through the primary phase allowing them to develop these skills and apply them to investigations in the classroom.

How are Science lessons delivered at Kings?

Teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all children are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following;

Through our planning, we involve problem solving opportunities that allow children to find out for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Teachers use precise questioning in class to test conceptual knowledge and skills.

We build upon the learning and skill development of the previous years. As the children's knowledge and understanding increases, and they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence.

Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding.

What is the impact?

Children not only acquire the appropriate age related knowledge linked to the science curriculum, but also skills which equip them to progress from their starting points, and within their everyday lives.

By the end of Key Stage 2, children have:

A wider variety of skills linked to both scientific knowledge and understanding, and scientific enquiry/investigative skills.

A richer vocabulary which will enable to articulate their understanding of taught concepts.

High aspirations, which will see them through to further study, work and a successful adult life.



Science Curriculum Aims

What are the aims of specific stages of the curriculum?

Key Stage 1:

The principal focus of 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 should be encouraged to be curious and ask questions about what they notice. They should be 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. They should 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 should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

Lower Key Stage 2:

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should 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 should 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. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out. 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 and data loggers
- 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.

**Upper Key Stage 2:**

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should 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, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should 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 should 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.

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 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.

See Primary National Curriculum for yearly breakdown of content.