

Brockwell Junior School

Science Policy

STATEMENT OF INTENT

In partnership with parents, the whole school will deliver excellence in science at all levels with a clear mission to be Safe, Smile & Succeed. It is vital that children develop a love and respect for a subject that constantly seeks to discover the truth in its findings, and adapts and moulds as new evidence is uncovered, adding to or replacing older knowledge and wisdom. We want our children to develop a sense of curiosity and excitement as they take their own steps on this journey. We want our pupils to develop rigorous skills – predictions based on prior knowledge, using these in a systematic way, and seeking an explanation for their results. We want our children to take these skills on to the next stage of their education (and beyond, into their adult life) so they are able to seek and identify truth, clarity and validity.

1. INTRODUCTION

Science is a core subject and a vital part of each child's education. At Brockwell, we recognise that 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. We aim to provide a quality science education that is differentiated for all abilities. It will use a wide range of learning materials and resources and be adapted to suit the range of learning styles. We aim to make science as inclusive as possible for children of all abilities and backgrounds. We aspire to use inquisitive enquiry-based learning to help in this process, supported by acquisitive knowledge-based activities / lessons, whenever appropriate.

2. 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.



3. SUBJECT CONTENT

At Brockwell, we follow the National Curriculum, teaching two strands to Science:

1. Scientific knowledge and conceptual understanding

This involves following a sequence of knowledge and concepts. Each pupil develops secure understanding of each key block of knowledge and concepts [such as electricity] in order to progress to the next stage.

2. Working Scientifically

'Working scientifically' focuses on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. 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.

For all key stages, 'Working scientifically' is always taught through and clearly related to the teaching of substantive science content in the programme of study. All pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at their key stage. By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

Key Stage 1 (Brockwell Nursery and Infant School)

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.

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.

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.

4. TEACHING AND LEARNING

Our science teaching will be based on Snap Science (Collins) and will be embedded in the development of a learning challenge curriculum. Opportunities for children to develop the required knowledge and understanding will be provided in a range of question and challenge approaches, although often the topic will be driven by the scientific content. On occasion, it will be necessary to teach science discretely in order to introduce and consolidate key concepts and skills. The children will also broaden their understanding of science through visits to places of interest, visitors into school and an annual 'STEM Focus'.

5. CONTINUITY AND PROGRESSION

Close monitoring of each year groups' planned Snap Science (Collins) objectives will ensure continuity and progression throughout the year groups and across the Key Stage. Each teacher works hard to ensure their pupils are developing skills, knowledge and understanding each year by expanding the range and depth of work.

Year Group	Year 3			Year 4		
Term	Sep - Dec	Jan - Apr	May - July	Sep - Dec	Jan - Apr	May - July
Module 1	<p><u>Amazing bodies</u></p> <p>In this module children will revisit the importance of eating the right amounts of different types of food, but will extend this knowledge to understand that the food we eat provides us with the nutrition that our bodies require to remain healthy. They will learn about the range of nutrients that humans need to consume in the correct amounts and the role that these nutrients play in keeping our bodies healthy. They will also learn that humans and some other animals have skeletons and muscles for support, protection and movement.</p>	<p><u>The power of forces</u></p> <p>During this topic, children will explore how forces can make objects start to move, speed up, slow down or change direction.</p> <p>They will compare how things move on different surfaces. They will learn that some forces need contact between two objects, but that magnetic forces can act at a distance.</p> <p>They will identify that magnets attract some materials and not others and that these are known as magnetic materials.</p> <p>They will learn that some metals, but not all, are magnetic and that all non-metals are non-magnetic. They will learn that magnets have two poles and that two magnets will attract or repel each other, depending on which poles are facing.</p>	<p><u>How does your garden grow?</u></p> <p>In this module children will revise the names of the main parts of a plant (root, stem/trunk, leaf and flower) introduced in Year 1, learning their functions and how these relate to their appearance and structure.</p> <p>They will learn about the absorption and transport of water and nutrients and the role of the leaf in making food for the plant. They will also learn about the parts of the flower, their roles in plant reproduction and the stages of the life cycle of a flowering plant, building on observations of growth of seeds and bulbs in Year 2.</p>	<p><u>Where does all that food go?</u></p> <p>In this module the children will learn about the human digestive system. They will be introduced to the main body parts associated with the digestive system; the mouth, tongue, teeth, oesophagus, stomach, intestines, rectum and anus. They will learn that the role of the digestive system is to break down the food we eat so that the nutrients, energy and other requirements we derive from it can be used in the rest of the body. They will learn about how food can be broken down through mechanical and chemical processes. They will learn in more detail about the roles of the different types of teeth in breaking food down, and how to care for their teeth.</p>	<p><u>In a state</u></p> <p>This module introduces the concept of states of matter. Children will learn the characteristic properties of solids, liquids and gases, first through physically exploring typical materials and then by classifying examples, such as powders and very viscous liquids, which are harder to classify.</p> <p>Using first-hand experience and secondary sources they will learn about changes of state and begin to understand freezing and boiling points as identifying characteristics of a material. They will learn the names of some common gases. They will have the opportunity to explore the expansion of liquids and gases when they are heated, using this to make a simple thermometer and explain how it works. They will also learn about the water cycle, modelling it in different ways and further developing their understanding of changes of state.</p>	<p><u>Who am I?</u></p> <p>In this module children will further develop the understanding of keys they gained in the Year 3 rocks module, using them to identify animals from a range of habitats.</p> <p>In addition to identifying animals children will also classify them, learning to identify characteristics of the main vertebrate groups and some of the common invertebrate groups.</p>

Module 2	<u>Can you see me?</u>	<u>Rock detectives</u>		<u>Good vibrations</u>	<u>Switched on</u>	
	<p>In this module children start their formal look at light, and whilst they will have some prior experience at home, this has not been covered in school before.</p> <p>They will explore what causes a shadow, as well as how the shape and size of a shadow can be affected by its position. They will learn how exposure to sunlight can cause harm, and about ways by which they can protect themselves. The children will carry out some investigations to test materials such as sunglasses and materials to reduce/block out light, and develop their skills with respect to the working scientifically strand of the curriculum.</p>	<p>In this module children will work as 'Rock Detectives' establishing core knowledge and understanding of rocks, their relationship to soils and how fossils have formed over time.</p> <p>In learning about rocks children will identify and name rocks, describing and comparing their observable properties and sorting them using a key.</p> <p>In learning about soils children will learn about what happens to cause rocks to break down and become soil particles and about the organic matter that is an essential part of a healthy soil.</p> <p>In learning about fossils children will discover what a fossil is and how they came to be formed from animal and plant remains.</p>		<p>In this module children will build on their understanding of hearing, which was covered in Year 1 during work around the senses.</p> <p>They will develop their vocabulary for describing sounds and identify different sound sources. They will learn that sounds are made by something vibrating and that these vibrations travel through a medium to the ear so that we hear them. They will learn that sounds get fainter as the distance from the sound source increases. They will explore ways to change the pitch and volume of sounds.</p>	<p>In this module children will identify electrical appliances, distinguishing between those which are powered by mains and battery (including those with integral rechargeable batteries) and recognising that electricity can be used to produce light, sound, heat and movement. Children will explore the production of light, sound and movement by making simple series circuits with cells, wires, bulbs, buzzers and motors, learning the names of the components. They will work mostly with single components.</p>	

Year Group	Year 5			Year 6		
Term	Sep - Dec	Jan - Apr	May - July	Sep - Dec	Jan - Apr	May - July
Module 1	<p><u>The Earth and beyond</u></p> <p>In this module children develop their knowledge of the Earth's (and other planets') place in the solar system, and their relationships with other bodies in space, in particular with the Sun.</p> <p>Children also learn how the Earth's orbit determines the length of a year and why we have leap years.</p>	<p><u>Feel the force</u></p> <p>In Year 3 children learned about how contact and non-contact forces make things start and stop moving. This module builds on these ideas and develops an understanding of how forces including gravitational attraction and drag forces – friction, air resistance, water resistance, and upthrust in water – affect movement.</p> <p>Children learn how mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect,</p> <p>They look at scientific ideas from the past and carry out an activity to find evidence to support or refute famous scientists' ideas.</p>	<p><u>Reproduction in plants and animals</u></p> <p>In this module children learn about reproduction in some types of plants and animals, including humans.</p> <p>As they learn about plant reproduction children will extend their knowledge from Year 3 of the function of the different parts of flowering plants. They will also learn that plants can reproduce in other ways, through asexual reproduction. As they learn about reproduction in animals children will find out more about specific mammals, birds, insects and amphibians and how they reproduce.</p>	<p><u>Everything changes</u></p> <p>This is a challenging module in which children build on their knowledge of living things and how they are adapted to particular environments.</p> <p>They are introduced to the idea that variation in organisms can result in the species becoming better adapted to its environment and that the process of natural selection, over a long period of time, leads to evolution.</p> <p>Children learn about how inherited characteristics are passed on from parents to offspring and that environmental variables also affect how organisms look and behave. They explore the process of selective breeding, through which humans can select particular characteristics in different plants and animals to meet specific requirements</p>	<p><u>Body pump</u></p> <p>In this module children learn about the human circulatory system and how it enables their bodies to function. They find out about the main parts of the circulatory system: the heart, blood vessels (arteries, veins and capillaries) and blood, and how these work together to deliver oxygen and nutrients to every part of the body. They will find out how the heart works, the main components of blood and the function of the different types of blood vessels.</p>	<p><u>The nature library</u></p> <p>In this module children will become aware of the types and characteristics of organisms that belong in each of the five kingdoms of living things (animals, plants, fungi, bacteria and Protista) and the major sub-groups the kingdoms include. Although they will devise their own systems of classification, children will learn about how Linnaeus developed the system for classifying all living things using their observable characteristics. They will be introduced to the idea of how scientists use 'conventions' in order to ensure that everyone means the same thing when they refer to, for example, an organism by its scientific name.</p>

Module 2	<u>Get sorted</u> In this module children identify, compare and classify a variety of materials according to both their properties and their uses. They explore familiar materials in a wide range of contexts and begin to recognise that a single material name, like 'metal' or 'plastic' can describe a considerable number of different materials that may display very different properties, but which still have features in common.	<u>Circle of life</u> In this module children extend their understanding of what a life cycle is, and learn about the life cycles of some familiar mammals, amphibians, insects and birds. Children compare and contrast different life cycles, identifying common features as well as explaining key differences. They use their knowledge of life cycles to help them as they create a fantastical creature of their own, complete with its own distinct life cycle. They learn about incredible journeys that some animals undertake to complete their life cycles.		<u>Light up your world</u> In this module children build on the work that they have done in Year 3 where they learned about light sources, how light enables us to see by reflecting from objects and how different objects reflect different amounts of light and shadows Here they develop a more detailed understanding of mirrors and the reflections that they form, and apply this understanding to make a periscope. They are introduced to ray diagrams that can be used to represent the behaviour of light. They use these diagrams, together with the fact that light travels in straight lines, to explain the formation of shadows and how their size and shape can be affected.	<u>Danger! low voltage</u> In this module children develop their understanding of electrical circuits and build on the work in the Year 4 module. The children learn to use the recognised electrical symbols to record circuits, particularly as the circuits become more complex.	
	Our Changing World modules		Lesson 1	Lessons 1 and 2 (more than once) Lesson 4 (more than once) Lesson 5 (more than once)	Lessons 1 and 2 (more than once) Lesson 4 (more than once) Lesson 5 (more than once)	Lessons 1 and 2 (more than once) Lesson 4 (more than once) Lesson 5 (more than once)

6. DIFFERENTIATION and RESOURCES

Snap Science (Collins) uses differentiated tasks and activities according to ability and by appropriate expectations of the outcome. We also take a mastery approach in which we expect pupils to develop and widen their understanding of a concept, exploring it in different ways, before moving onto the next objective.



7. ASSESSMENT

Scientific knowledge and conceptual understanding

This is an on-going part of teaching and learning, involving observing pupils at work and talking and listening to them. Online assessment tools such as Kahoot will be used to assess understanding in a fun, child centred way. At the end of the year, class teachers will make comments on the annual report to parents.

Working Scientifically

High quality investigations form an intrinsic part of enquiry. Science data for every child is recorded electronically on Brockwell's assessment tracker, iTRACK, as each area is assessed or at the end of the cycle.

Beyond the National Curriculum and STEM Links

STEM via University

Stem Ambassadors into school

Magna

3D printing

Digital Embroidery

Robotics

VEX GO



8. MONITORING

This will include termly plans, children's work and children interviews. The Science Coordinator will have regular discussion with colleagues and will, where possible, observe class teaching and displays. The Science Coordinator will ensure that children at Brockwell make the appropriate progression in the subject and make judgements regarding standards in the subject. These reports will be given to the Headteacher, the SLT and the Governors of the school.

9. RESOURCES

Snap Science (Collins) can be accessed via <https://connect.collins.co.uk/>. Resources are centrally located in the Science cupboard as well as in individual class areas.

The range includes books, posters, a variety of equipment and ICT software. The school library also has appropriate resources for children to use.

10. HEALTH AND SAFETY

At all times, children will be taught how to care for and handle equipment and media safely and with respect. When working with tools, equipment and materials, in practical and in different environments, including those that are unfamiliar, pupils will be taught:

- about hazards, risks and risk control

- to recognise hazards, assess consequent risks and take steps to control the risks to themselves and others
- to manage their environment to ensure the health and safety of themselves and others
- to explain the steps they take to control risk

Further information can be found on the ASE website as well as in their publication, 'Be Safe!'

11. INCLUSION

We teach Science to all children, whatever their ability and individual needs. Our teachers provide learning opportunities that are matched to the needs of children with learning difficulties. We strive to meet the needs of all pupils with special educational needs, disabilities, special gifts and talents, and of those learning English as an additional language. We encourage children to communicate their scientific learning in a variety of ways including written, verbal and pictorial.

We enable all pupils to have access to the full range of activities while studying Science. Where children participate in activities outside the classroom (a visit to a local pond, for example) we carry out a risk assessment beforehand, to ensure that the activity is safe and appropriate for all pupils, including those with additional needs.

12. CELEBRATION AND DISPLAY

Display is a valuable tool for sharing science work and should be a vehicle for celebrating the child's work within this subject. Science work will be displayed within classrooms and throughout the school.

13. SCHOOL AND COMMUNITY

We recognise that the local area and the local people offer a wealth of stimuli for science work. Some opportunities to explore science outside the school building include exploring forces through a trip to the park; exploring plants through a trip to the garden centre or exploring different types of rocks through a trip to Castleton. We encourage parents and community members with Science-related hobbies or jobs to share their experiences with the children. These visitors to school include local allotment owners, a representative from the Chesterfield Association from the blind and a local veterinary nurse.

14. POLICY REVIEW

This policy will be reviewed as part of the school's annual policy review system.

W.Baker (STEM)

Science Coordinator

September 2023

To be reviewed: September 2024