

## Science Policy

### Science Intent:

At Northwick Manor Primary School, we recognise the importance of Science in every aspect of daily life. What is important to remember is that by the time our pupils leave school, there will be jobs and careers that have not been invented yet. At Northwick, Science is fundamental to equipping children with the necessary skills that they can adapt and apply in order to fulfil their potential. We have chosen to look at the specific disciplines of Biology, Chemistry, Physics and Earth Science, so that children are made aware of the breadth, depth and importance of learning in Science.

Our curriculum is in conjunction with the aims of the National Curriculum which provides breadth and ambition. In Science our intent is for pupils to:

- Develop an enthusiasm and enjoyment of scientific learning and discovery;
- Develop scientific knowledge and conceptual understanding through purposeful, investigative activities;
- Nurture a curiosity of nature, to raise and answer scientific questions about the world around them;
- Be equipped with the scientific knowledge required to understand the uses and implications of Science, today and for the future;
- Be able to communicate their learning in a range of ways using a broad, scientific vocabulary.

We fulfil the National Curriculum requirements at Northwick Manor Primary School by teaching Science through the five disciplines of Scientific enquiry and investigation; foundations of Biology; foundations of Chemistry; foundations of Physics and foundations of Earth Science. We provide all pupils regardless of ethnic origin, gender, class, aptitude or disability with a broad and balanced Science 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.

The 'big questions' outlined below are the driving factors for Science and occur with our three curriculum drivers in mind: aspiration, ambition; opportunity and pupil power.



*Scientific enquiry and investigation*

*Our curriculum enables pupils to get better at developing enquiry questions and conducting scientific investigations.*

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*During the primary years, children develop the skills required to apply their growing knowledge to practical investigations. They ask and refine questions, explore the substance of their questions through experimentation and investigation, becoming increasingly systematic and accurate as they do so. They record their findings, drawing on their observations to develop explanations. They learn to evaluate how they have gone about their investigation so that they can improve the validity of their work. As they progress, children study the work of selected scientists to understand the contribution to the growth of human knowledge and to the quality of human life which scientists have made, to build their knowledge of the scientific method of enquiry and to understand how scientists grapple with dilemmas as they look to find better answers to fundamental questions.*



### **Foundations of Biology**

*Our curriculum enables pupils to get better at observing, describing, explaining and understanding the life processes of organisms.*

*During the primary years, children begin to address three 'big questions' which are fundamental to their understanding of biology and life sciences: "What kinds of life are there?", "How do living things survive and grow?" and "What makes life go on?"*

*Children observe and study the diversity of living things, building their knowledge of characteristics and classification of the animal and plant kingdoms. They learn that all living things adapt to their environments and that change and diversity is a result of evolution. They observe and study the life processes in living things which are essential for survival and reproduction, and the factors which affect healthy life cycles.*



### **Foundations of Chemistry**

*Our curriculum enables pupils to get better at observing, describing, explaining and understanding the properties of materials and how they can be changed.*

*During the primary years, children begin to address two 'big questions' which are fundamental to their understanding of chemistry and the science of materials: "What are things made from?" and "How can form change?"*

*Children investigate different materials and their properties, and how materials are selected and created to suit their purpose. They develop understanding of the action of change of temperature on how materials change and change their state. They observe and study how reversible change differs from non-reversible change.*



### **Foundations of Physics**

*Our curriculum enables pupils to get better at observing, describing, explaining and understanding forces and energy.*

*During the primary years, children begin to address three 'big questions' which are fundamental to their understanding of physics and the study of natural phenomena: "What makes objects move?", "How does energy make things happen?" and "How can forces be changed and controlled?"*

*Children observe, describe and begin to explain manifestations of fundamental laws of physics relating to forces and energy: the motion of objects, the action of magnetic force, simple electrical circuits, how light travels and behaves and how sound is created and travels.*



### **Foundations of Earth science**

*Our curriculum enables pupils to get better at observing, describing, explaining and understanding the composition of the Earth and its planetary properties.*

*During the primary years, children begin to address two 'big questions' which are fundamental to their understanding of Earth science: "What is the Earth made from?" and "How does the Earth's position in the solar system dictate its climate and conditions for life?" Children investigate rocks and soils and learn about the structure of the Earth's surface. They study the position of the Earth in the solar system, explaining the phenomena of day and night, seasonal change and the phases of the Moon.*

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### Our Aims and Objectives

Science teaches an understanding of natural phenomena. It aims to stimulate a child's curiosity in finding out why things happen in the way they do. It teaches methods of enquiry and investigation to stimulate creative thought. Children learn to ask scientific questions and begin to appreciate the way Science will affect their future on a personal, national, and global level. At Northwick Manor Primary School, we believe in active learning, with the children having a 'hands on' approach to Science. We want the children to become excited at the prospect of investigating and experimenting, and enjoy their learning.

The aims of science are to enable children to:

- ask and answer scientific questions;
- plan and carry out scientific investigations, using equipment, including new technology, correctly;
- know and understand the life processes of living things;
- know about the properties of different materials and how they can be changed;
- know and understand the physical processes of materials, electricity, light, sound and natural forces;
- know about the nature of the solar system, including the Earth;
- evaluate evidence and present their conclusions clearly and accurately.

### Policy into Practice

#### Teaching and learning style

We use a variety of teaching and learning styles in science lessons. Our principal aim is to develop children's knowledge, skills, and understanding. Sometimes we do this through whole-class teaching, group, partner or individual work. At other times we engage the children in an enquiry-based research activity.

We encourage the children to ask, as well as answer, scientific questions, and use visual, auditory and kinaesthetic skills.

They have the opportunity to use a variety of data, such as statistics, graphs, pictures, and photographs. They use ICT in Science lessons where it enhances their learning. They take part in role-play and discussions and they present reports to the rest of the class. They engage in a wide variety of problem-solving activities. Wherever possible, we involve the pupils in 'real life' scientific activities which are relevant to their interests; we try as far as possible to put the concepts into contexts they will understand.

We use a variety of recording methods. We encourage the use of correct scientific vocabulary in independent writing, and use tables, graphs, labelled diagrams and annotated photographs. As the children become more experienced, we encourage them to choose their own ways to record work.

Where possible we include cross-curricular links to other subjects including English, Mathematics and D.T. All classes include ICT in Science lessons where relevant. A range of

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other information sources, such as textbooks, reference books, guest speakers, trips and artefacts are used to enhance lessons as well as for cross-curricular links.

Teachers try to provide opportunities for children to develop thinking skills, wherever possible including time for speaking and listening, working with learning partners, discussions and group thinking. We encourage independent learning with the use of research, including the Internet.

### Access and Inclusion

We recognise that there are children of widely different scientific abilities in all classes and we ensure that we provide suitable learning opportunities for all children by matching the challenge of the task to the ability of the child. We achieve this in a variety of ways by:

- setting common tasks which are open-ended and can have a variety of responses;
- setting tasks of increasing difficulty to challenge and extend all groups of learners;
- we have a flexible approach to grouping children and setting a variety of tasks and activities to suit their needs.
- providing resources of different complexity, matched to the ability of the child;
- using learning assistants when available to support the work of individual children or groups of children.
- We endeavour to challenge and extend the more able through a range of activities and events to stimulate their learning (E.g. Science Ambassadors; Ogden Trust Showcase; MAT Science days).

### Science curriculum planning

The curriculum planning incorporates all areas of Science. We aim to have a broad and balanced curriculum; each year group studying different disciplines of Science from a range of concepts.

Our Science planning follows the School's planning format. The curriculum contexts for learning outline the scientific skills and knowledge studied throughout the school.

Our progression grids along with our medium-term plans identify the skills and progression for each area of Science and these are linked to the programme of study in the National Curriculum for England. The Science subject leaders review these plans as part of the school's subject monitoring system.

Each year group is responsible for writing medium term plans. These plans list the specific learning objectives of each lesson. Plans are updated as necessary to include new ideas, IWB resources, etc. Areas of differentiation and challenge are also noted here.

The learning sequence has been carefully designed to ensure that prior knowledge and skills are built upon and link to the next steps for learning. We ensure that there are opportunities for children of all abilities to deepen their understanding. For example, under the heading 'Animals including humans', Year 2 children study basic needs for survival, while Year 4 study basic digestion in humans and in Year 6 they progress to looking at the circulatory system.

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Development of 'Working Scientifically' is developed and extended as the children progress through the units of Science.

### **Early Years Foundation Stage**

In the Foundation Stage Science comes under "Understanding the World" and, within that, "The Natural World".

Assessment focuses on the development of skills that are related to age specific aims, culminating in the early learning goals. Teachers use this to identify the next steps of learning to ensure children are ready to access the National Curriculum on entry to Year 1.

### **The contribution of Science to teaching in other curriculum areas**

#### **English**

Science contributes significantly to the teaching of English in our school by actively promoting the skills of reading, writing, speaking and listening. The children develop oral skills in Science lessons through discussions and through recounting their observations of scientific experiments. They develop their writing skills through writing reports and projects and by recording information.

#### **Mathematics**

Science contributes to the teaching of Mathematics in a number of ways. The children use measures and learn to use and apply number. Through working on investigations, they learn to estimate and predict. They develop the skills of accurate observation and recording of events. They use numbers in many of their answers and conclusions. They produce graphs and charts which in turn are used to analyse their data.

Our planning also takes into consideration the range of ways that children can record their work, such as graphs, tables, posters and diagrams.

#### **Computing**

Children use computing skills in Science lessons where possible. They use it to support their work by learning how to find, select, and analyse information on the Internet. Children use computers to record, present and interpret data and to review, modify and evaluate their work and improve its presentation. Interactive whiteboards provide a variety of resources and stimuli. They also use data handling programs to produce branching databases; I-Pads to record data, as well as data loggers and sensors to detect sound, light and temperature and a Pulse meter.

#### **Personal, social and health education (PSHE) and citizenship**

Science makes a significant contribution to the teaching of Personal, Social and Health Education. Matters of citizenship and social welfare are raised through the subject matter.

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### **Spiritual, Moral, Social and Cultural Development**

Science teaching offers children many opportunities to examine some of the fundamental questions in life, for example, the evolution of living things and how the world was created. Through many of the amazing processes that affect living things, children develop a sense of awe and wonder regarding the nature of our world.

Science raises many social and moral questions. Through the teaching of Science, children have the opportunity to discuss, for example, the effects of smoking and the moral questions involved in this issue. We give them the chance to reflect on the way people care for the planet and how Science can contribute to the way we manage the Earth's resources. Science teaches children about the reasons why people are different and, by developing the children's knowledge and understanding of physical and environmental factors, it promotes respect for other people.

### **SENd / Inclusion**

As Science leaders, we aim to create a learning environment where every pupil feels included, valued and encouraged. We strongly believe in inclusivity within the classroom for all pupils and for them to be given the opportunity to reach their full potential within each Science lesson using a range of approaches to help with their understanding and ability.

We provide an enriching and creative experience for all pupils and strive to support all children by how we structure the physical environment of our classrooms. We believe each child deserves to see themselves reflected in the classroom and in our Science curriculum.

### **Assessment and record keeping**

We assess children's work in Science by making informal judgements as we observe them during lessons. On completion of a piece of work, the teacher marks the work and comments as necessary.

We realise the importance of day to day questions as part of our formative assessments, asking questions such as "what do you think...?", and "can you explain why...?", "can you think of any...?"

### **Resources**

We aim to have sufficient resources for all Science-teaching units in the school. We keep these in a central store where there is a box of equipment for each area of Science. Off-site visits to places such as 'Bishops Wood' also provide valuable resources.

### **Health and Safety**

Refer to the publications 'ASE' and 'CLEAPSS' which contain advice on health and safety matters relating to Science. See Health & Safety Coordinator for details of where they may be found.

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Safety factors are undertaken before any Science activities, wherever they take place. The teacher and pupils can discuss together whether any safety issues need to be taken into account, so that ownership by all is undertaken. **It is the responsibility of each member of staff to ensure the safety of themselves and those around them.** In the event of any accident, there are various first aiders in school, and contact should be made via the school office.

Please inform the Science subject leaders of any broken or damaged equipment so that it can be replaced safely.

### Equal Opportunities

Equal opportunities exist for all children to expect and receive a broad, balanced and differentiated Science curriculum, irrespective of their race, gender or ability. All teachers are aware of these factors, and aim to provide appropriate challenges for all abilities.

### Monitoring

It is the responsibility of the Science subject leaders to monitor the standards of children's work and the quality of teaching in Science. This takes place in conjunction with the school's monitoring schedule. This includes the observations of teaching and learning across the school, questionnaires to stakeholders, etc. The Science subject leaders are also responsible for supporting colleagues in the teaching of Science, for being informed about current developments in the subject and for providing a strategic lead and direction for the subject in the school.

### Development and review

The monitoring and review of the standards of children's work and of the quality of teaching in Science is carried out within a three-year cycle in line with the school's policy.

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