



## Manor Primary School Policy Document

### Science Policy

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Approved by Governors	
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*‘Our vision is to create a school community where children grow into happy, confident and responsible individuals, who work hard together to achieve their full potential.’*

## **POLICY STATEMENT**

Science stimulates, excites and satisfies a pupil's curiosity about phenomena and events in the world around them. At Manor, carefully planned experiences link practical investigations with ideas to engage learners and serve as a spur to critical and creative thought. Through science, pupils understand how scientific ideas contribute to technological change – impacting on industry, business and medicine and improving the quality of life. As they progress, pupils learn to question and discuss science-based issues that may affect their own lives and the future of the world.

## **AIMS OF SCIENCE POLICY**

At Manor, we aim to:

- **Develop scientific knowledge and conceptual understanding** by building on pupils' curiosity and sense of awe of the natural world.
- **Develop pupils' skills of investigation** – including observing, questioning, planning, experimenting, predicting, measuring, recording, interpreting, hypothesising, communicating and evaluating.
- **Provide pupils with the opportunities to apply** their knowledge, skills and ideas in real life contexts and become aware of the uses of science in the wider world.
- **Help foster concern about, and active care for, our environment.**
- **Develop pupils' use of information and communication technology (ICT)** in their science studies.
- **Enable pupils to become effective communicators** of scientific ideas, facts and data by using the language and vocabulary of Science.
- **Develop pupils' social skills** so that they can work responsibly and cooperatively with others, develop resilience and persevere when they are faced with a challenge.
- **Extend the learning environment** for our pupils via our school grounds and Ivybridge locality
- **Promote a 'healthy lifestyle'** for our pupils.

## **ACHIEVING AND MAINTAINING HIGH STANDARDS**

At Manor we want pupils to enjoy Science and be fully engaged in their lessons. We want them to be challenged by the process of learning Science, as well as enabled to make great progress. To ensure pupils reach the high standards we expect, staff will ensure:

- ☑ Teaching and Learning activities are challenging, motivating and extend pupils' learning, ensuring progress in the short, medium and long term.
- ☑ Pupils will aim for **mastery** of each topic. They will be able to access opportunities and challenges to deepen their thinking further. The mastery of a subject ensures independence, confidence, excellent recall of facts and the ability to apply key skills and knowledge to a range of concepts across the curriculum.
- ☑ High emphasis is placed on the development of pupils' skills of working scientifically.
- ☑ Assessment informs teaching so that there is provision for support, repetition and extension of learning for each child, at each level of attainment.
- ☑ Groupings are fluid and work is differentiated according to current need.
- ☑ The learning environment is ordered and well-resourced, the atmosphere is purposeful and children feel safe.

## **PLANNING**

Science topics for each term are decided by the Manor Primary Curriculum Map – a rolling programme of topics designed to cover all aspects of the new National Curriculum. Science planning for Years 1 to 6 follows The National Curriculum 2014 Science Guidelines and the updates of May 2015. The programmes of study for Science describe a sequence of knowledge and concepts and are set out year-by-year for Key Stages 1 and 2. ***See Appendix 1 – Summary of Science statutory requirements.***

Teachers will base their planning on the programmes of study for their relevant year groups. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, teachers have the flexibility to introduce content earlier or later than set out in the programme of study, depending on the pupils' needs, interests and class groupings. Staff must ensure pupils have a firm understanding of each key block of knowledge and concepts before progressing to the next stage.

In the Foundation Stage, science forms the basis of ELG 14 – Knowledge and Understanding of our World. In the Early Years the development of scientific thought is an important area of experience. Learning should be active, bearing in mind the requirements of the EYFS Curriculum Guidance.

To ensure pupils have a safe and secure environment in which to learn, specific risks are identified and addressed when planning an activity, in line with the **COSHH guidance 'Be Safe'**.

## **TEACHING AND LEARNING**

Science is taught on a weekly basis from Y1 to Y6 and supported and enhanced through other curriculum areas. Teachers use a variety of interactive teaching methods and groupings to deliver the curriculum and achieve the set learning objectives.

### **Key features of science teaching and learning include:**

- Lessons have clear learning intentions and success criteria which are shared and reviewed with the pupils effectively.
- Activities for all abilities promote a '**Growth Mindset**' and are challenging, motivating and extend pupils' learning. High expectations are maintained and pupils are encouraged to share responsibility for their own learning.
- Good use is made of a wide range of resources and direct first-hand experiences.
- Teachers give clear and accurate explanations and use skilful questioning as a tool to further understanding. They explicitly teach the process skills for investigations e.g. observing, planning, predicting etc.
- Pupils have frequent opportunities to develop their skills in, and take responsibility for, planning investigative work, selecting relevant resources, making decisions about sources of information, carrying out activities safely and deciding on the best form of communicating their findings.
- High standards of presentation are expected
- Pupils are praised effectively to encourage and motivate them and are well supported according to their needs
- Lessons make effective links with other curriculum areas and subjects, especially literacy, numeracy and ICT.

## **ASSESSMENT, RECORDING and REPORTING**

### **Formative assessment**

We use ongoing AfL to refine planning and identify next steps, based on the **TAPS (Teacher Assessment of Primary Science)** pyramid model of pupil, teacher, teaching team and school assessment for learning. Pupil progress is continually assessed by teachers through questioning, observing practical activities, listening to pupil discussion, through scrutinising the work in pupils' books and focussed assessment tasks. Marking is developmental, using a WWW and EBI approach on most pieces of work. The children themselves are fully involved in the process of self-improvement, recognising their achievements and acknowledging where and how they can improve.

### **Summative assessment**

Before beginning a new Science topic, children undergo some form of **pre-topic assessment**. This could take the form of a whole-class mind map, a concept cartoon for groups to discuss, a diagram to label and explain or a pre-unit test. The information gathered from this exercise will help teachers fine-tune their planning to the needs and interests of the class, while giving an indication of how securely each individual child is working within their year group.

During the course of the topic teachers will incorporate **focussed assessment tasks** into their planning which will evidence how each child is progressing and again shape future planning.

Towards the end of each Science topic, teachers again assess understanding and progress in the form of an **end-of-topic assessment** and this information is used, in conjunction with the **Interim Teacher Assessment Framework – see Appendix 2** to help complete the annual report to parents and inform future planning.

## **EQUAL OPPORTUNITIES**

The Science policy reflects and supports the equal opportunities ethos of the school. All children will have access to the Science curriculum appropriate to their age and need.

## **CURRICULUM LEADERSHIP**

The Science Subject Leader role will include:

- \* *Inspiring an exciting and creative approach to Science teaching*
- \* *Supporting teaching through leading INSET, giving advice and guidance, modelling, lesson observations and feedback, team teaching and monitoring of planning and assessment.*
- \* *Sharing information acquired from courses that may be beneficial to staff.*
- \* *Ensuring Science teaching and learning is constantly improved and updated through the creation and completion of a termly action plan.*
- \* *Tracking pupil progress and using data to further improve science teaching and learning.*
- \* *The management, maintenance and storage of resources, and purchase of new resources when necessary.*
- \* *Reporting to Governors and others when necessary.*

## **Appendix 1 – Summary of Science statutory requirements**

### **Key stage 1 programme of study - years 1 and 2**

#### **Working scientifically**

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

#### **Year 1 programme of study**

##### **Plants**

Pupils should be taught to:

- 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

##### **Animals, including humans**

Pupils should be taught to:

- 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

##### **Everyday materials**

Pupils should be taught to:

- 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

### **Seasonal changes**

Pupils should be taught to:

- observe changes across the 4 seasons
- observe and describe weather associated with the seasons and how day length varies

## **Year 2 programme of study**

### **Living things and their habitats**

Pupils should be taught to:

- 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

### **Plants**

Pupils should be taught to:

- 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**

Pupils should be taught to:

- 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

### **Uses of everyday materials**

Pupils should be taught to:

- 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

## **Lower key stage 2 programme of study – years 3 and 4**

### **Working scientifically**

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.

### **Year 3 programme of study**

#### **Plants**

Pupils should be taught to:

- 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

#### **Animals, including humans**

Pupils should be taught to:

- 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

## **Rocks**

Pupils should be taught to:

- 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

## **Light**

Pupils should be taught to:

- 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

## **Forces and magnets**

- 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

## **Year 4 programme of study**

### **Living things and their habitats**

Pupils should be taught to:

- 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**

Pupils should be taught to:

- 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**

Pupils should be taught to:

- 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

## **Sound**

Pupils should be taught to:

- 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

## **Electricity**

Pupils should be taught to:

- 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

## Upper key stage 2 – years 5 and 6

### **Working scientifically**

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 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

### **Year 5 programme of study**

#### **Living things and their habitats**

Pupils should be taught to:

- 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

#### **Animals, including humans**

Pupils should be taught to:

- describe the changes as humans develop to old age

#### **Properties and changes of materials**

Pupils should be taught to:

- 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

### **Earth and space**

Pupils should be taught to:

- 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

### **Forces**

Pupils should be taught to:

- 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

### **Year 6 programme of study**

#### **Living things and their habitats**

Pupils should be taught to:

- 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

#### **Animals including humans**

Pupils should be taught to:

- 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

## **Evolution and inheritance**

Pupils should be taught to:

- 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

## **Light**

Pupils should be taught to:

- 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

## **Electricity**

Pupils should be taught to:

- 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

## **Appendix 2 – Interim Teacher Assessment Framework**

### **Interim teacher assessment framework for Science at the end of key stage 1 - September 2015**

#### **Working at the expected standard**

The first statements relate to working scientifically, which must be taught through, and clearly related to, the teaching of substantive science content in the programme of study.

The pupil can:

- ask their own questions about what they notice
- use different types of scientific enquiry to gather and record data, using simple equipment where appropriate, to answer questions including:
  - observing changes over time
  - noticing similarities, differences and patterns
  - grouping and classifying things
  - carrying out simple comparative tests
  - finding things out using secondary sources of information
- use appropriate scientific language from the national curriculum to communicate their ideas in a variety of ways, what they do and what they find out.

The remaining statements relate to the science content.

The pupil can:

- name and locate parts of the human body, including those related to the senses, and describe the importance of exercise, balanced diet and hygiene for humans
- describe the basic needs of animals for survival and the main changes as young animals, including humans, grow into adults
- describe basic needs of plants for survival and the impact of changing these and the main changes as seeds and bulbs grow into mature plants
- identify whether things are alive, dead or have never lived
- describe and compare the observable features of animals from a range of groups
- group animals according to what they eat, describe how animals get their food from other animals and/or from plants, and use simple food chains to describe these relationships
- describe seasonal changes
- name different plants and animals and describe how they are suited to different habitats
- use their knowledge and understanding of the properties of materials, to distinguish objects from materials, identify and group everyday materials, and compare their suitability for different uses.

## Interim teacher assessment framework for Science at the end of key stage 2 - September 2015

### **Working at the expected standard**

Working scientifically: this must be taught through, and clearly related to, the teaching of substantive science content in the programme of study.

- The pupil can describe and evaluate their own and other people's scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources.
- The pupil can ask their own questions about the scientific phenomena they are studying, and select and plan the most appropriate ways to answer these questions, or those of others, recognising and controlling variables where necessary – 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.
- The pupil can use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate.
- The pupil can record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- The pupil can present findings and draw conclusions in different forms, and raise further questions that could be investigated, based on their data and observations.
- The pupil can use appropriate scientific language and ideas from the national curriculum to explain, evaluate and communicate their methods and findings.

Science content:

- The pupil can name, locate and describe the functions of the main parts of the digestive, musculoskeletal, and circulatory systems, and can describe and compare different reproductive processes and life cycles, in animals.
- The pupil can describe the effects of diet, exercise, drugs and lifestyle on how their bodies function.
- The pupil can name, locate and describe the functions of the main parts of plants, including those involved in reproduction and transporting water and nutrients.
- The pupil can use the observable features of plants, animals and micro-organisms to group, classify and identify them into broad groups, using keys or in other ways.
- The pupil can construct and interpret food chains.
- The pupil can explain how environmental changes may have an impact on living things.
- The pupil can use the basic ideas of inheritance, variation and adaptation to describe how living things have changed over time and evolved; and describe how fossils are formed and provide evidence for evolution.

- The pupil can group and identify materials, including rocks, in different ways according to their properties, based on first-hand observation; and justify the use of different everyday materials for different uses, based on their properties.
- The pupil can describe the characteristics of different states of matter and group materials on this basis; and can describe how materials change state at different temperatures, using this to explain everyday phenomena, including the water cycle.
- The pupil can identify, and describe what happens when dissolving occurs in everyday situations; and describe how to separate mixtures and solutions into their components.
- The pupil can identify, with reasons, whether changes in materials are reversible or not.
- The pupil can use the idea that light from light sources, or reflected light, travels in straight lines and enters our eyes to explain how we see objects, and the formation, shape and size of shadows.
- The pupil can use the idea that sounds are associated with vibrations, and that they require a medium to travel through, to explain how sounds are made and heard.
- The pupil can describe the relationship between the pitch of a sound and the features of its source; and between the volume of a sound, the strength of the vibrations and the distance from its source.
- The pupil can describe the effects of simple forces that involve contact (air and water resistance, friction), and others that act at a distance (magnetic forces, including those between like and unlike magnetic poles; and gravity).
- The pupil can identify simple mechanisms, including levers, gears and pulleys that increase the effect of a force.
- The pupil can use simple apparatus to construct and control a series circuit, and describe how the circuit may be affected when changes are made to it; and use recognised symbols to represent simple series circuit diagrams.
- The pupil can describe the shapes and relative movements of the sun, moon, earth and other planets in the solar system; and explain the apparent movement of the sun across the sky in terms of the earth's rotation and that this results in day and night.