



Mountford Manor

Curriculum Policy

Science

“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.”

– Marie Curie (1867 - 1934)

Curriculum Intent:

At Mountford Manor Primary School, children are supported, guided and inspired through our excellent teaching practises, to achieve academic success through a [knowledge-engaged](#) approach to the curriculum, which centres around a key stimulus.

Developing the whole child is at the centre of everything we do and our intention is that the curriculum extends opportunity, raises aspiration and opens children's eyes to the world beyond their immediate environment.

Through our values based approach, the curriculum encourages children to become kind, considerate and accepting individuals who make positive contributions to their community and beyond.

At Mountford we aspire for children to **Make the Most** of their **Potential**.

To do this, we strive for children to;

- Be **Motivated Learners**
- Seek **Meaningful futures**
- Become **Proud citizens**

In order for us to ensure our pupils "Make the Most of their Potential" 5 instrumental **Golden Threads** underpin and weave through everything we do at the school. We believe these threads enable children to have the essential knowledge and skills that they need to be educated citizens.

1. **Embed values** and a sense of community
2. **Develop oracy** through immersing pupils in a language rich environment
3. **Cultivate a sense of value** in the love of reading
4. **Enable and facilitate opportunities** and **experiences** to accumulate advantage; inspiring ambition and aspiration.
5. **Encourage curiosity**; pupils want to pupils do more, to know more; and therefore, remember more.

How the **5 Golden Threads** are embedded in our Science Curriculum

Golden Thread	How this is embedded in Science
Embed Values	Through learning about different scientific concepts and ideas; children develop an appreciation of a growth mindset. As a school we value the importance of failure in learning and children grow their resilience and perseverance through this process. This supports pupils in becoming rounded; valuable citizens.
Develop Oracy Skills	Children are provided with opportunities to analyse and evaluate their Science investigations and topics. Children are given the opportunity to plan Science investigations and describe and discuss the outcomes. Children are encouraged to share and evaluate their findings with the class to review and discuss. In each topic, children are exposed to key scientific vocabulary which enables them to understand and apply their scientific understanding in their learning.
Cultivating a culture of readers	Where possible, children's Science unit has links to and/or is inspired by a key text.
Giving exposure to real life opportunities and experiences	Throughout the year, children are provided with many real- life opportunities in Science. One key opportunity is taking part in TWHF Science Festival each year which provides children with a wealth of real-life science experiences. Children also have the opportunity to speak to other professionals in many branches of Science to broaden their understanding of Science in the wider world. Children are made aware of the different types of careers and opportunities the world of Science brings. Work is celebrated with various stakeholders (including) parents and opportunities are planned so that children can share what they are learning with others at home.

Encourage curiosity

In Science children are encouraged to ask questions and seek answers. Children understand that by doing more will enable them to know and remember more. Through Science, children build upon their prior scientific knowledge and skills which enable them to develop a wider curiosity; motivating them to learn further.

Science Curriculum Intent

The Intent of the Science Curriculum at Mountford Manor is to provide 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.

Aims and Objectives:

The Science curriculum at Mountford Manor 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

Curriculum Map (Progression and sequencing):**EYFS – Understanding of the world (The World)**

Science at Foundation Stage (Reception) is covered in the 'Understanding the World' area of the EYFS Curriculum. It is introduced indirectly through activities that encourage pupils to explore, problem solve, observe, predict, think, make decisions and talk about the world around them.

Early Years Science also helps pupils with skills in other Foundation Stage areas of the National Curriculum, such as Physical Development and Expressive Arts and Design.

In the EYFS at Mountford Manor, pupils will be encouraged to explore, problem solve, observe, predict, think, make decisions and talk about the world around them through structured play.

This will include;

- Exploring creatures, people, plants and objects in their natural environments.
- Observing and manipulating objects and materials to identify differences and similarities. For example, pupils may look at an egg whisk, sand, paper and water to learn about things that are natural and manmade and their different functions.
- Learn to use their senses, feeling dough or listening to sounds in the environment, such as sirens or farm animals.
- Make observations of animals and plants and explain why some things occur and talk about changes.
- Encouraged to ask questions about why things happen and how things work through activities such as increasing the incline of a slope to observe how fast a vehicle travels, or opening a mechanical toy to see how it works.
- Encouraged to ask questions about what they think will happen to help them communicate, plan, investigate, record and evaluate findings.

Whole School Working Scientifically progression

Running alongside a Science knowledge curriculum, at Mountford Manor each year group are given working scientifically objectives to work to over the course of the year. These objectives are to be planned for, taught and assessed and should be interwoven into each Science unit. Each working scientifically skills is built upon each Key phase and ensures the pupil is reading for their next stage of scientific learning.

		Year 1 and 2	Year 3 and 4	Year 5 and 6
Plan	Planning	<ul style="list-style-type: none"> asking simple questions and recognising that they can be answered in different ways 	<ul style="list-style-type: none"> asking relevant questions and using different types of scientific enquiries to answer them setting up simple practical enquiries, comparative and fair tests 	<ul style="list-style-type: none"> planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
	Do	Observing /obtaining evidence	<ul style="list-style-type: none"> observing closely, using simple equipment performing simple tests identifying and classifying 	<ul style="list-style-type: none"> making systematic and careful observations and where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
Recording		<ul style="list-style-type: none"> gathering and recording data to help in answering questions 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Review	Concluding	<ul style="list-style-type: none"> using their observations and ideas to suggest answers to questions 	<ul style="list-style-type: none"> reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions identifying differences, similarities or changes related to simple scientific ideas and processes Using straightforward scientific evidence to answer questions or to support their findings 	<ul style="list-style-type: none"> 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.
	Evaluating		<ul style="list-style-type: none"> using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. 	<ul style="list-style-type: none"> using test results to make predictions to set up further comparative and fair tests. identifying scientific evidence that has been used to support or refute ideas or arguments

Key Stage 1

		Y1 Pupils should be taught to:	Y2 Pupils should be taught to:
Biology	Plants	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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.
	Living things and their habitats		<ul style="list-style-type: none"> • 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 micro-habitats • 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.
Chemistry	Everyday materials	<ul style="list-style-type: none"> • 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 	
	Uses of everyday materials		<ul style="list-style-type: none"> • 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..
Physics	Seasonal changes	<ul style="list-style-type: none"> • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies 	

		Y3 Pupils should be taught to:	Y4 Pupils should be taught to:
Biology	Plants	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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
	Living things and their habitats		<ul style="list-style-type: none"> • 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.
Chemistry	Rocks	<ul style="list-style-type: none"> • 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. 	
	States of Matter		<ul style="list-style-type: none"> • 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
Physics	Light	<ul style="list-style-type: none"> • 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 a solid object 	

	<ul style="list-style-type: none"> • find patterns in the way that the size of shadows change. 	
Sound		<ul style="list-style-type: none"> • 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.
Forces and Magnets	<ul style="list-style-type: none"> • compare how things move on different surfaces • notice that some forces need contact between two 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 two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing. 	
Electricity		<ul style="list-style-type: none"> • 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

		Y5 Pupils should be taught to	Y6 Pupils should be taught to
Biology	Animals including humans	<ul style="list-style-type: none"> describe the changes as humans develop to old age 	<ul style="list-style-type: none"> 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
	Living things and their habitats	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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
	Evolution and inheritance		<ul style="list-style-type: none"> 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
Chemistry	Properties and changes of materials	<ul style="list-style-type: none"> 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. 	
Physics	Light		<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> 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.
	Forces	<ul style="list-style-type: none"> • 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. 	
	Earth and Space	<ul style="list-style-type: none"> • 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 that apparent movement of the sun across the sky. 	

The Teaching and Learning of Science

At Mountford Manor, we approach teaching and learning of Science through 6 Key Principles. These 6 principles are key to effective teaching but by its very nature, teaching is a creative profession so there is no prescribed formula for the way they are implemented in the classroom.

These 6 Key Principles are;

1.CHALLENGE

With the mastery learning model, rather than prejudging potential outcomes and stifling expectations by setting a host of differentiated learning objectives, there is a single challenging learning objective (Challenge for all). Staff are expected to consider what each individual student needs to achieve it and adjust their lesson accordingly.

All students may have different starting points but should aspire to the learning objective and a teacher should tailor and adapt their teaching;

- focused questioning;
- adult/ peer help with starting their sentences;
- Modelled and worked examples
- Manipulatives and practical apparatus to support learning

It is about equity of opportunity, not all getting exactly the same to reach the objective. The aim is to keep students in the challenge zone.

2.EXPLANATION

Three key principles should guide explanations:

1. Plan in to schemes of learning how to **link to and build on something already known**. a. Begin each lesson with a short review of previous learning (Rosenshine, 2012)

2. Allow for the **limitations of the working memory** when asking students to take on board new information, giving instructions, asking them to sort key bits of information etc. a. Present new information in small steps with student practice after each step (Rosenshine, 2012)

3. Where possible try to make the **abstract concrete** – think about and plan, how to make abstract ideas make sense:

- a. Drawing diagrams; demonstrations; sharing and discussing images; taking the learning outside etc.
- b. Provide scaffolds for difficult tasks (Rosenshine, 2012)
- c. Direct explicit instruction (Kirschner, Sweller, Clarke, 2006)

3.MODELLING

Explain the key ideas, then model how to do it / what to do with it. This falls in to two main categories:

1. **Model the creation of products/procedures.** For example: write an essay, *show* them how to do it. Write it out on the board and discuss how/why you are doing each step as you go. Question them on what is being done. Explain, out loud, thought processes. If mistakes are made, point them out.
2. **Deconstruct expert examples and use worked examples** – have an excellent finished product and share it, discuss why it is good.

4.PRACTICE

Plan in time, during the lesson and over a series of lessons, for students to practice using new knowledge and skills. Consider the type of practice and its purpose:

1. Practice for fluency and long-term retention – repeating things in order to master them; coming back to things in subsequent lessons etc.
2. Deliberate ‘intelligent’ practice at the outer reaches of ability – allowing students to make connections and see patterns. Practising at the outer reaches of ability means students will have to layer skills and use them with agility.
 - a. Guide student practice (Rosenshine, 2012)
 - b. Require and monitor independent practice (Rosenshine, 2012)

5.FEEDBACK

Plan in how you will give feedback during/after lessons and – for this feedback to be meaningful -how you will allow students to respond this feedback. Feedback is a two-way process and the teacher should use the students’ feedback to inform future planning.

Moreover, it is our goal to nurture independent and agile learners who have the skills to be successful in an increasingly globalised and rapidly changing world. To achieve this, we must equip students to be critical and reflective learners in their own right by ‘learning how to learn’. Students need to be engaged in their own learning, be part of the creation of their ‘next steps’ and have the opportunity to assess their own work and that of their peers in a meaningful and useful manner.

1. Engage students in weekly and monthly review (Rosenshine, 2012)
2. Guide student practice

6.QUESTIONING

Some questions can be planned for but some should be responsive to what is happening in the lesson. When considering planned questions, they should be to:

1. Check for understanding – i.e. hinge questions that students should be able to answer at a certain point in the lesson, before they move on.
 - a. Ask a large number of questions and check the responses of all students,
 - b. Check for understanding (Rosenshine, 2012)
2. Provoke deeper thinking
3. Increase the ratio of participation and thinking of all students

Inclusion and the Science Curriculum

When teaching at Mountford Manor, staff are aware of children’s individual needs and how to best scaffold teaching and learning, to enable access for all. Teachers consider; a range of resources, classroom organisation and management strategies to ensure optimal access for all learners, including those with

physical and learning needs. Teachers have access to specialist support for advice on target setting and assessment. All SEND pupils are identified (through the Swindon Core Standards paperwork and on the Mountford Manor' SEND register). Their progress is systematically recorded and monitored in individual provision maps / Termly SEN assessments.

Monitoring and Assessment

EYFS

In EYFS the new skills and knowledge learnt in Science is evidenced by collecting photos and work produced by a child and placing it in their Learning Journeys (Tapestry).

Children's Scientific knowledge and skills are assessed by judging them against the Early learning goals set out in the EYFS Profile documentation.

Key Stage 1

In KS1 the new skills and knowledge learnt in Science is evidenced through a combination of work in books and pupil's responses to key scientific questions.

Children's Scientific knowledge and working scientifically skills are assessed by teacher judgement. These judgements are matched against whether pupil's work and pupil's responses to key questions show progress against the age related expectations. To ensure progression of knowledge and skills from year group to year group, teachers are to use the key questions outlined in each unit of work as a measure of whether a child is on track. Any gaps in knowledge and skills is to be addressed so each child is best prepared for the next stage of their learning.

Key Stage 2

In KS2 the new skills and knowledge learnt in Science is evidenced through a combination of work in books and pupil's responses to key geographical questions.

Children's Scientific knowledge and working scientifically skills are assessed by teacher judgement. These judgements are matched against whether pupil's work and pupil's responses to key questions show progress against the age related expectations. In Year 6, teachers also use standardised tests to validate these judgements against a national context (scale score) To ensure progression of knowledge and skills from year group to year group, teachers are to use the key questions outlined in each unit of work as a measure of whether a child is on track. Any gaps in knowledge and skills is to be addressed so each child is best prepared for the next stage of their learning.

Review

To be reviewed September 2023 by Rebecca Smith (Science Lead at Mountford Manor).