What is Science?

How do scientists learn and work?

Our Subject Leader's Policy & Guide

'I Dream Of Being'….created by us to meet the needs of our children, create aspiration and deliver our core intention.

Intent For Our Science Curriculum

Vision For Science
At Mayfield, we value science as a subject, which stimulates awe, and wonder in our everyday lives. We believe science can have a transformative effect on children, helping them to become curious and inspired by the world around them. We believe that a high-quality science education should engage, stimulate and challenge pupils, equipping them with the knowledge and skills to better understand their life and their planet. We encourage children to learn from, be inspired by the work of great scientists, and understand the contribution science has made to society, both past and present. As pupils progress, we support them to be able to pose increasingly complex scientific questions and carry out experiments to work accurately and analytically.

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How We Plan For, And Teach, Science

At Mayfield, science is taught every half term. Teachers plan sequences of lessons across the unit that will build on and develop the children's knowledge and skills. Each unit of learning has a strong foundation in new knowledge – linked to prior knowledge – that will support the children to understand increasingly complex scientific phenomena and processes. Scientific vocabulary is mapped and taught rigorously to ensure that children can both recognise, understand and use scientific terminology accurately and confidently. Carefully selected skills are planned to best match each unit of knowledge and progress year on year. Opportunities to practise and embed skills are planned for so that they are revisited and refined over time. The knowledge and skills that children will develop throughout each science topic are mapped across each year group and across the school to ensure progression.

The Mayfield **'I Dream Of Being…'** scheme of work is designed around **ten broader 'scientific enquiry' disciplinary concepts**. From early years onwards, children visit knowledge and skills in **three key substantive areas: starting point biology; starting point chemistry: starting point physics.** The route through the curriculum ensures that prior knowledge and skills are revisited to ensure retention in long-term memory and built upon to develop increasingly sophisticated understanding in a meaningful context. We break down these substantive areas into **termly or half-termly projects e.g. our bodies; states of matter; teeth and digestion that run across the seven year journey**. Science's presence is maintained through the position of **Science Stations** in each classroom, whilst the profile of scientific reward, achievement and celebration throughout the school year is maintained via the role of **Student Subject Champions, Subject Celebrations** and **Subject Achievement Displays**. Rewards always have a specific eye upon personal progress rather than summative attainment. Science continues via our enrichment, wider curriculum opportunity: **Formula One STEM Club** which runs during the year.

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How We Assess Science Learning

Teachers continually evaluate children's learning through both formative and summative assessment opportunities. In each lesson, teachers ensure children are assessed against the learning objectives and subsequent planning and lesson adaptation is responsive to gaps and misconceptions.
Big Questions are prompted and carefully positioned to aide teachers with this. Each unit/project have **quizzing** and **self-quizzing** opportunities to assess the retention of new knowledge and vocabulary. Children have the opportunity to self-assess their progress using these methods as well as peer-assessment with partners and group members.
Summative judgements are also made using the **Key Milestones Document**. At the end of the year, class teachers then use the children's recorded work and ongoing assessments to make a judgement as to whether each child is working at the expected standard.
The most frequently used strategy is **Brain Gym** which has been devised to hold some of the activities highlighted above but above all else as a planned opportunity for daily review of prior learning - a form of recap. This aims to strengthen the connections between what the children learn - such recall then frees that working memory for the new learning to come.

How We Adapt & Record Learning And Outcomes In Science

Ways of demonstrating progress and outcomes must be adaptable to suit the needs of learners and the requirements of the subject. Therefore each subject has its own bespoke way of gathering evidence from learners. Otherwise recording work becomes a barrier to learning rather than a chance to celebrate children's achievements and specialist skills and knowledge in areas where they may otherwise excel.

In science, children's work is gathered in:
Individual Science Exercise Books

NAVIGATE

Science @ Mayfield

DISCIPLINARY CONCEPTS

- PLANNING FOR ENQUIRY
- CLASSIFYING
- SORTING & GROUPING
- OBSERVING
- TAKING MEASUREMENTS
- RECORDING & EXPLAINING RESULTS
- ASKING SCIENTIFIC QUESTIONS
- MAKING PREDICTIONS
- DRAWING CONCLUSIONS
- EVALUATING ENQUIRY

SUBSTANTIVE CONCEPTS

STARTING POINT BIOLOGY

- ANIMALS INCLUDING HUMANS
- PLANTS
- LIVING THINGS & THEIR HABITATS
- SEASONAL CHANGE
- EVOLUTION & INHERITANCE

STARTING POINT CHEMISTRY

- PROPERTIES OF MATERIALS
- CHANGING MATERIALS

STARTING POINT PHYSICS

- FORCES
- LIGHT
- ELECTRICITY
- SOUND
- EARTH & SPACE

PROJECTS

EARLY YEARS

Seasonal Changes….Forces...Humans & Senses...Materials & Changes...Living Things….Habitats….Plants

YEAR 1: AUTUMN Seasonal Change Everyday Materials	YEAR 1: SPRING Seasonal Change Identify & Name Plants	YEAR 1: SUMMER Our Bodies Identify & Name Animals	YEAR 2: AUTUMN Living Things & Habitats Animals Including Humans	YEAR 2: SPRING Plants - Seeds & Bulbs	YEAR 2: SUMMER Uses of Everyday Materials
YEAR 3: AUTUMN Animals Including Humans Light	YEAR 3: SPRING Rocks & Soils Forces	YEAR 3: SUMMER Plants - Parts of Flowering Plants	YEAR 4: AUTUMN Teeth & Digestion	YEAR 4: SPRING Sound Living Things & Habitats	YEAR 4: SUMMER Electricity States of Matter
YEAR 5: AUTUMN Properties & Changes of Materials	YEAR 5: SPRING Animals Including Humans Earth & Space	YEAR 5: SUMMER Living Things & Habitats Forces	YEAR 6: AUTUMN Evolution & Inheritance	YEAR 6: SPRING Animals Including Humans Living Things & Habitats	YEAR 6: SUMMER Light Electricity

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Science Overview

	Autumn	Spring	Summer
EYFS	During the year, the children will continue to **make sense of themselves as a human** through the hands-on experiences using all five senses. Children will be observing **forces** at play and begin to explore magnetism. Taking a first look at **living things and their habitats** - children will develop a sense of life cycles and care for all living things, whilst learning about different environments. Across Spring and Summer, the children will continue to explore the natural world through looking at the **basic life cycle of a plant** and how to care for them. The children will be looking at **materials and the changes that can occur to them.** Across the year, the children will observe the **changes across the four seasons.**		
Year One	Continuing our **seasonal change** work, begun in EYFS, our children will be observing and describing weather linked to Autumn and Winter and how the day length varies at this time of year. **An introduction to Everyday Materials:** where the children are introduced to a variety of materials describe their properties and compare and group them based upon this.	**Plants: identifying and naming** a range of common wild and gardens plants and trees including their basic structure. Concluding our **seasonal change** work, linked to EYFS and Autumn Year 1, our children will be observing and describing weather linked to Spring and Summer and how the day length varies at this time of year.	**Animals Including Humans**: identify, name, describe and compare including basic parts of the human body. The children will then move on to identify and name a variety of common animals considering whether they are carnivores, herbivores or omnivores.
Year Two	**Living Things & Their Habitats:** Begin to explore and compare the differences between things that are living, dead, and things that have never been alive. **Animals Including Humans:** The basic needs of animals, including humans, for survival.	**Plants:** Children will observe and describe how seeds and bulbs grow into mature plants and what they need to stay healthy.	The next stage in materials: '**The Uses of Everyday Materials**'. Identify and compare the suitability of materials for particular uses. How shapes of solid objects made from certain materials can be changed and altered.
Year Three	**Animals Including Humans:** Skeletons and movement and keeping a healthy body through nutrition are the focus this term. **Light Part 1:** A study of how light and dark function and a study of shadows.	After an introduction to **materials** in KS1, the children move on to consider **Rocks & Soils.** by making comparisons on the basis of appearance and physical properties and developing knowledge into how fossils and soil are formed. **Forces & Magnets Part 1:** This forms the focus for the second half term as the children consider magnetic forces and the concept of attract or repel.	**Plants:** The life cycle of plants, the conditions for life and growth and the functions of parts of a flowering plants within their life cycle.
Year Four	**Animals Including Humans:** Teeth and the digestive system moving into food chains - identifying producers, predators and prey.	**Sound:** How sounds are made. How sound travels - volume, pitch and vibrations. **Living Things & Their Habitats:** Recognise that living things can be grouped in a variety of ways including classification keys.	**Electricity Part 1:** Introduction to simple circuits, their components, their uses and conductors and insulators. Next stage of **Materials: States of Matter.** Identifying solids, liquids and gases. Changing stage when heating and cooling linking to temperate, evaporation and condensation.
Year Five	**Properties and Changes of Materials.** Compare and group based upon solubility, transparency and conductivity (electrical and thermal). Then moving onto a wider study of **reversible and irreversible changes.**	**Animals Including Humans: Changes with Age** including key periods in the human life cycle. **Earth & Space:** Earth, other planets, the sun and the moon and their movements in relation to each other.	**Living Things & Their Habitats:** Life cycles of mammals, amphibians, insects and birds. Children will also learn about reproduction in some plants and animals. **Forces Part 2:** Air resistance, water resistance, friction and building upon their learning about gravity from their Earth & Space studies.
Year Six	**Evolution & Inheritance:** the children will learn about how living things have changed and evolved over time.	**Animals Including Humans:** Circulatory system and damage to the body will be studied during this work. **Living Things & Their Habitats:** Detailed classification of plants, animals & micro-organisms.	**Light Part 2:** Considering how light travels. Its relationship between light sources, objects and our eyes. **Electricity Part 2:** Control of circuits and use of circuit symbols including application of Part 1 knowledge.

Intent For Our Science Curriculum

An Awareness Of Year 7 Coverage & Direction

We have designed our curriculum with a view upon the learner's progression into KS3 in mind.
As such, we have considered the curriculum of our feeder high school where almost all of our learner's attend upon leaving Mayfield.
Therefore our projects either give knowledge that can be taken into more specific and detailed studies at Year 7
or allow for new areas to be studied that can draw upon and make relevant comparisons to Mayfield projects.

Science - Curriculum Map — Year 7

Y7	Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Topics	Introduction to science, Matter.	Speed, Cells, Energy.	Materials, Reproduction.	Electricity, Science week,	Sound, Earth & universe.	Climate change. Science project.
Key terms	Safety, equipment, investigations, recording data, graph skills, analysing data, evaluating data. States of matter, state properties, changing state, melting, condensing, temperature.	Gravity, mass vs. weight, asteroids, contact & non-contact forces, balanced & unbalanced forces, speed, relative motion, distance time graphs. Cell structure, microscopes, specialised cells, diffusion, unicellular & multicellular, organisation. Energy stores, energy efficiency, power, energy in fuels, energy resources, photosynthesis, respiration.	Pressure, diffusion in gases, diffusion in liquids, solubility, filtration, evaporation, distillation, chromatography. Reproductive organs, puberty, adolescence, menstrual cycle, fertilisation, foetus development, pregnancy.	Static electricity, current, potential difference, series & parallel circuits, resistance.	Properties of waves, wave speed, sound waves, pitch, frequency, amplitude, the ear, ultrasound. Structure of the Earth, day & night, seasons, solar system, phases of the moon.	The greenhouse effect, the carbon cycle, global warming, recycling.

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Science Vocabulary

A core set of **science vocabulary** has been created for the children across school. The vocabulary is progressive from EYFS onwards and at all times retains vocabulary previously introduced. We have chosen this language based upon the perspective of being a scientist considering the broader concepts and skills and also 'project specific terms'. The vocabulary is present around the **Science Stations** in the learning spaces.

The vocabulary selected by the teacher is taken from our core list and will include the scientist's enquiry words and those specific to the current project. We should see these words recurring many times across projects and year groups. The idea is repeatedly expose to language and then develop a greater understanding and use of this terminology. Familiarity leads to confidence which leads to deployment of this new vocabulary.

Here are examples of the two kinds of vocabulary we have identified.

Scientist Vocabulary: Observe; Measure; Question

Project Vocabulary: Light; Reflect; Switch; Battery

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