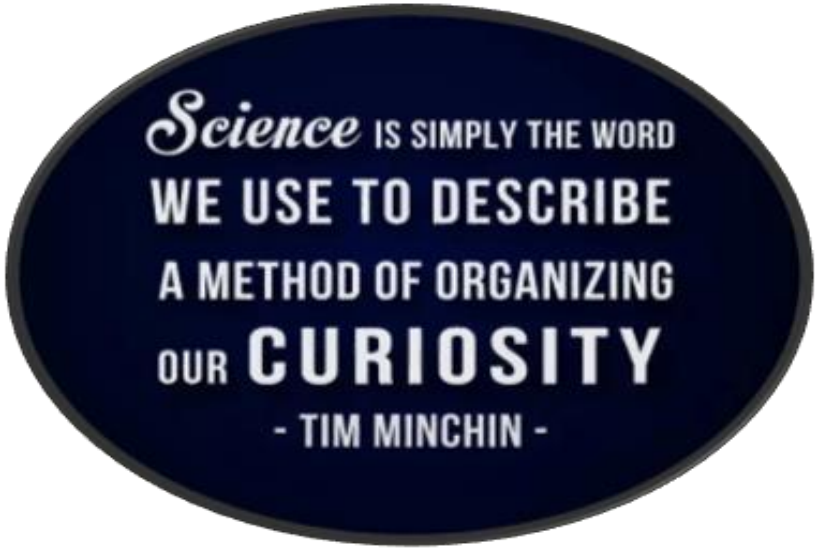


Science

Intent

Implementation

Content Spine

Key Concepts

Progression Maps

Science Intent

Why do we teach science?

At Emmbrook Junior School, our science curriculum is designed to provide children with a solid foundation in scientific knowledge and understanding. We aim to inspire curiosity about the world around them by connecting lessons to real-life experiences, making science relevant and engaging. Through hands-on experiments and investigations, children will develop critical thinking and problem-solving skills, learning to ask questions, test hypotheses, and analyse results. Collaborative group work encourages teamwork and effective communication, allowing children to share ideas and learn from each other. Our goal is not only to cultivate a love for science but also to instil resilience and adaptability as they tackle challenges in their experiments. We want to prepare children for future studies in science, helping them become confident, inquisitive learners ready to navigate an ever-changing world.

Science Intent

What is our curriculum aim?

At Emmbrook Junior School, we provide our pupils with a broad and balanced curriculum designed to inspire their curiosity about the world through the scientific disciplines of Biology, Chemistry, and Physics. We offer children scientific knowledge and methodologies, while also providing real-life contexts that make their learning relevant. Our students are encouraged to recognize the power of rational explanation through exciting investigations that build on their natural curiosity, allowing them to design, carry out, and evaluate their own scientific inquiries.

Lessons are underpinned by opportunities for practical activities. This hands-on approach—coupled with established theory—fosters a sense of wonder and curiosity about the world they live in.

In an ever-changing world, where our children's future jobs may not yet exist, it is vital that we equip them with the necessary tools to contribute to our evolving understanding of the world, recognize how science has already changed their lives, and envision how it may shape their future.

Science Implementation

How is science taught at Emmbrook Junior School?

At Emmbrook Junior School, we have crafted our science curriculum into thematic units across the key stage that develop children's understanding of current scientific knowledge as well as the critical thinking skills required for investigative work. This is achieved through inquiry-based learning, where children engage in practical experiments and investigations, encouraging them to ask questions, formulate hypotheses, and test their ideas. Lessons often relate to everyday life, making science relevant and stimulating curiosity.

Science is taught in integrated units that combine different areas of study (e.g., exploring plants and animals together). Teachers may also integrate science with other subjects like maths, geography, and art to provide a broader learning experience. An important aspect of our teaching is the emphasis on scientific vocabulary, helping students articulate their ideas and deepen their understanding of concepts.

In lessons, we expect children to use a variety of tools and materials (e.g., hand lenses, scales, and measuring instruments) to facilitate hands-on learning. They will explore our local environment, such as the pond and wooded areas, to enhance their learning through real-world exploration. Children are encouraged to work collaboratively in pairs or small groups, promoting teamwork, discussion, and peer learning. They will have opportunities to share their findings with classmates, enhancing their communication skills and understanding, including the use of tablets, computers, and interactive whiteboards for research, simulations, and presentations.

Science Implementation

How is science taught at Emmbrook Junior School?

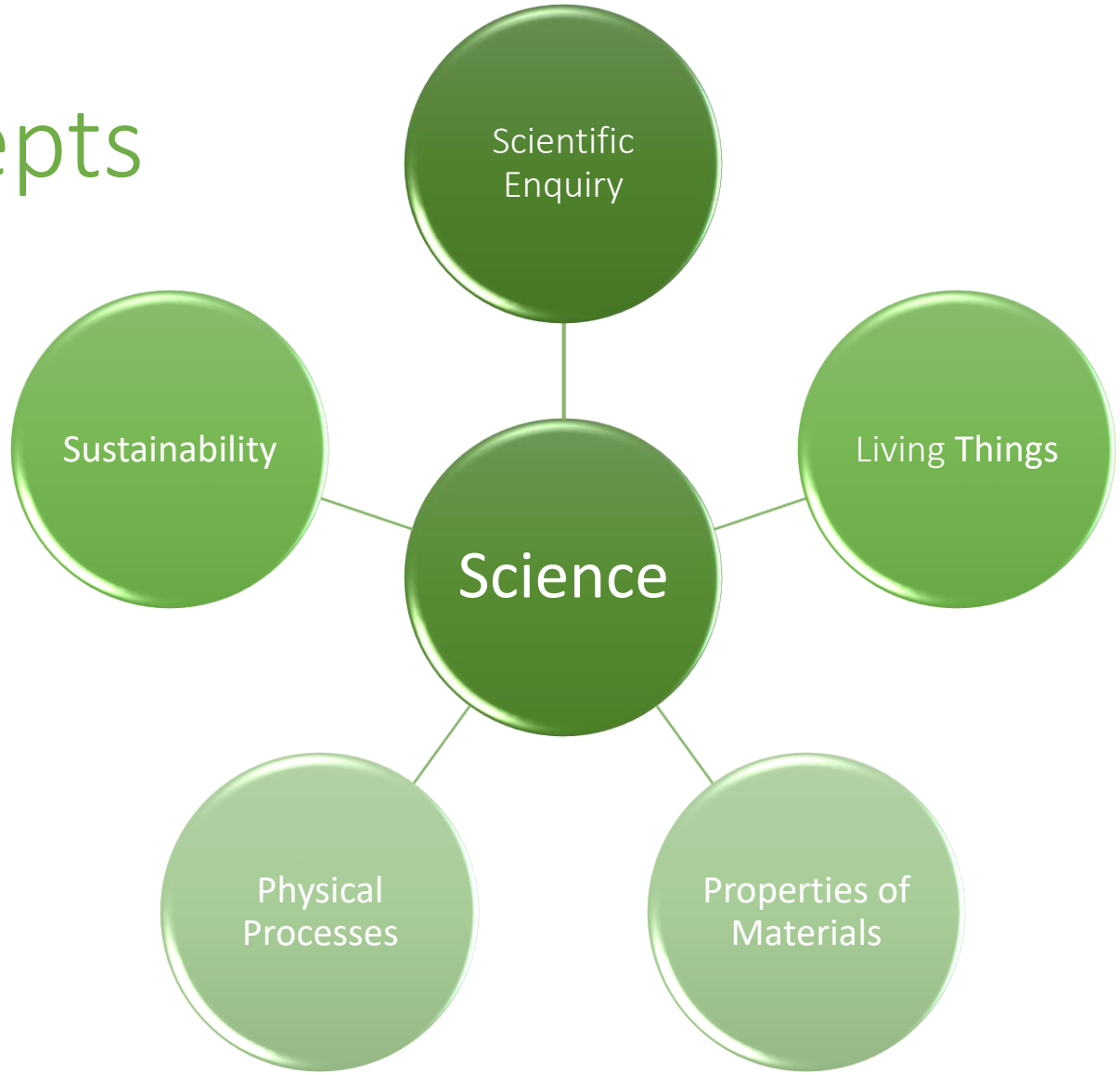
Throughout lessons, teachers will use quizzes, observations, and discussions to assess understanding, along with more formal assessments at the end of units to evaluate knowledge and skills gained. Where appropriate, lessons are adapted to meet the diverse needs of students, ensuring that all learners can engage with and understand the material.

By combining these approaches, we aim to develop children's knowledge, skills, and enthusiasm for science, preparing them for further study and fostering a lifelong interest in the subject.

Science Content Spine

	Autumn		Spring		Summer	
Year 3	**Push and Pull** *Physical Processes*	**Rocks and Relics** *Properties of Materials*	**Predator** *Living Things*	**Let There be Light** *Physical Processes*	**Let it Grow** *Living Things*	**Under the Ground** *Sustainability*
Year 4	**Off the Grid** *Sustainability*	**Turn It Up – Sound** *Physical Processes*	**Changing State** *Properties of Materials*	**Burps, Bottoms and Bile** *Living Things*	**Circuit Creator** *Physical Processes*	**Creatures and Their Homes** *Living Things*
Year 5	**Stargazers** *Physical Processes*	**Mix It Up** *Properties of Materials*	**Properties** *Properties of Materials*	**Developing living things** *Living Things*	**Sustainable Farming** *Sustainability and Living Things*	**Scream Machine** *Physical Processes*
Year 6	**Bloodheart** *Living Things*	**Let there be more light** *Physical Processes*	**Switch it on** *Physical Processes*	**Evolve and Adapt** *Living Things*		**Sustainable Me** *Sustainability*

Science
Key Concepts



Science Progression Map – Scientific Enquiry

Year 3

- Recognize the importance of collecting data to answer questions.
- Act on suggestions and propose ideas for finding answers.
- Conduct fair tests and explain why they are fair.
- Predict outcomes before tests using scientific reasoning.
- Measure length accurately with scientific equipment.
- Use scientific vocabulary to describe observations.
- Record observations, comparisons, and measurements in tables, charts, text, and labelled diagrams.
- Provide reasons for observations.
- Identify patterns in data and attempt to explain them.
- Suggest improvements to enhance scientific work.

Year 4

- Recognize that scientific ideas are based on evidence.
- Choose the most appropriate approach (e.g., a fair test) to investigate a question.
- Describe how to vary one factor while keeping others constant.
- Make predictions based on scientific understanding and reasoning.
- Select relevant information from provided sources.
- Identify potential risks in investigations.
- Make observations using appropriate materials and equipment.
- Record observations using tables and bar charts.
- Plot points to create line graphs.
- Use data to identify patterns.
- Consider how changing one variable can affect another.
- Suggest improvements to scientific work and justify them.

Science Progression Map – Scientific Enquiry

Year 5

- Describe how experimental evidence and creative thinking combine to provide a scientific explanation.
- Choose the most appropriate approach to answer a question.
- Select relevant information from various sources.
- Identify key factors for conducting a fair test in an investigation.
- Make predictions based on scientific knowledge and understanding.
- Select and plan the use of apparatus effectively.
- Make precise observations, comparisons, or measurements.
- Use appropriate scientific language and conventions to communicate data.
- Draw conclusions consistent with evidence and relate them to scientific knowledge.
- Suggest practical improvements to working methods.

Year 6

- Describe evidence supporting accepted scientific ideas and explain how scientists' interpretation of evidence leads to new ideas.
- Use scientific knowledge to choose the best approach to answer a question.
- Effectively select and use sources of information.
- Make sufficient measurements, comparisons, and observations for the task.
- Choose appropriate scales for graphs and diagrams to effectively display data.
- Select and use suitable methods to communicate qualitative and quantitative data.
- Identify measurements and observations that deviate from the main pattern.
- Draw conclusions consistent with the evidence, using scientific knowledge to explain them.
- Make reasoned suggestions for improving working methods.

The practical scientific methods, processes and skills described above are to be taught through the context of Living Things, Properties of Materials and Physical Processes.

Science Progression Map – Living Things

Year 3

- Understand the essentials for human health: air, clean water, varied food, and regular exercise.
- Distinguish between living and non-living things.
- Grasp basic life processes.
- Recognize the harmful effects of drugs on the body.
- Describe skeleton functions.
- Understand how exercise impacts muscles and heart rate.
- Know that muscles work in pairs to produce movement.
- Use scientific names for major organs or systems and locate them in the body.
- Explain changes in living things, such as plant responses to light or water.
- Observe and measure plant growth carefully.
- Recognize the role of healthy roots, stems, and leaves in plant growth.
- Identify plant organs (e.g., stamens, stigma, root hairs) and their functions.
- Explain seed dispersal and its importance.

Year 4

- Understand feeding relationships between plants and animals in a habitat.
- Use food chains to describe these relationships, including terms like predator and prey.
- Recognize that most food chains begin with green plants.
- Group plants and animals based on similarities and differences.
- Create and use keys to systematically identify and group living things.
- Understand how tooth shape relates to function.
- Recognize that animal diets influence their teeth.
- Know how diet impacts human health, including effects on teeth.

Science Progression Map – Living Things

Year 5

- Understand all basic life processes.
- Explain how energy is transferred in animals through digestion and absorption.
- Recognize the interdependence of plants and animals in a local habitat and define consumers and producers.
- Describe reproduction in animals, including humans.
- Outline the main stages of the life cycles of humans and flowering plants, noting similarities.
- Explain the functions of plant parts such as stamen, stigma, style, petal, and sepal.
- Understand that green plants need light and water to grow, producing new material from air and water in their leaves.
- Know that plants produce flowers with male and female organs, and seeds form when pollen fertilizes the ovum.
- Describe pollination, fertilization, seed dispersal, and germination processes.

Year 6

- Understand that blood flows from the heart through arteries and returns via veins.
- Know that blood transports oxygen and essential materials around the body.
- Identify major food groups and their sources.
- Recognize how diet, exercise, drugs, and lifestyle affect body function.
- Understand the role of micro-organisms, both beneficial and harmful.
- Identify species at risk of extinction and describe conservation programs.
- Explain how nutrients and water are transported within animals.
- Appreciate the diversity of living things and the importance of classification.
- Understand how environmental factors determine organisms' habitats.
- Describe classification of living things into broad groups based on observable characteristics and similarities, including micro-organisms, plants, and animals.

Science Progression Map – Properties of Materials

Year 3

- Sort materials into groups based on their properties.
- Classify rocks by observable characteristics, such as texture and permeability.
- Understand that soils originate from rocks and vary based on their source.
- Explain how fossils form when living things are trapped in rock.
- Use magnetism to separate materials.

Year 4

- Explain the differences between solids, liquids, and gases, and use these differences to classify substances.
- Identify characteristics of good thermal insulators and their everyday uses.
- Distinguish between reversible changes (e.g., freezing) and irreversible changes (e.g., baking clay).
- Understand that temperature measures how hot or cold something is.
- Use scientific terms like evaporation and condensation to describe changes of state.
- Accurately use a thermometer and know water freezes at 0°C and boils at 100°C.
- Recognize that materials can exist as solids or liquids and that solids melt at different temperatures.
- Describe and reverse processes related to water changing state.
- Explain the water cycle using evaporation, condensation, and other processes.
- Use magnetism, sieving, filtration, and distillation to separate materials.
- Select appropriate methods for separating mixtures, including decanting, sieving, and magnetism.
- Understand that dissolved solids form solutions, breaking into particles small enough to pass through filters.
- Describe factors affecting the rate at which solids dissolve.

Science Progression Map – Properties of Materials

Year 5

- Identify metallic properties (e.g., electrical conductivity) to distinguish metals from other solids.
- Understand that indicators differentiate acids from alkalis.
- Justify the use of materials (e.g., metals, wood, plastic) based on evidence from tests.
- Recognize contexts where changes occur, such as evaporation and condensation.
- Explain factors affecting evaporation and how to speed it up (e.g., using a hairdryer).
- Provide examples of how heating and cooling can change materials, including irreversible changes like burning.
- Understand how temperature influences evaporation and condensation rates.
- Know that some materials dissolve to form solutions and describe how to recover substances from them.
- Demonstrate that dissolving, mixing, and state changes are reversible.
- Suggest methods to separate similar mixtures based on separation techniques (e.g., filtration, sieving).
- Explain the solubility limit of solids in liquids and how water volume affects dissolving capacity.
- Apply knowledge of solids, liquids, and gases to separate mixtures through filtering, sieving, and evaporation.

Year 6

- No content in Year 6

Science Progression Map – Physical Processes

Year 3

- Link cause and effect in physical processes, e.g., explaining a bulb doesn't light due to a break in the circuit.
- Construct circuits with multiple bulbs.
- Understand that the amount of electricity depends on the number of cells in a circuit.
- Build circuits to test materials for electrical conductivity.
- Explain that metals are good conductors and plastics are good insulators.
- Draw simple circuit diagrams using standard symbols.
- Explain that shadows form when light is blocked by an object.

Year 4

- Link cause and effect in physical processes, such as how a push or pull changes an object's speed or movement.
- Describe the direction of forces between magnets or within a spring.
- Classify materials as magnetic or non-magnetic.
- Explain methods to increase air and water resistance.
- Understand friction as a force between moving surfaces and how to increase or decrease it.
- Measure forces accurately using a force meter.
- 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.

Science Progression Map – Physical Processes

Year 5

- Understand that air resistance is the frictional force acting in the opposite direction to weight when an object falls.
- Explain that gravitational attraction between the Earth and objects causes weight.
- Identify the effects of air resistance, water resistance, and friction on moving surfaces.
- Use models to explain the effects of Earth's movement, such as the length of a day or year.
- Explain the Moon's changing appearance over a 28-day cycle.
- Describe the movement of the Earth and other planets relative to the Sun in the solar system.

Year 6

- Use concepts to explain how to make changes in an electrical circuit, such as altering the current.
- Set up a circuit to investigate different ideas.
- Understand that current flow is the same at all parts of a circuit.
- Compare and explain variations in component function, such as bulb brightness, buzzer loudness, and switch positions.
- Indicate the direction of light using straight lines or arrows.
- Recognize that light from objects can be reflected by a mirror.
- Identify factors that affect the size and position of shadows.
- Use the idea that light travels in straight lines to explain how objects are seen by reflecting or emitting light into the eye.

Science Progression Map – Sustainability

Year 3

- Recognise that living things depend on their environment and that changes can affect survival.
- Identify simple ways humans can have positive and negative impacts on the environment (e.g., littering, recycling).
- Describe how resources such as water and electricity are used in daily life and suggest basic ways to reduce waste.
- Observe and record findings about local environments, noting any signs of pollution or environmental change.

Year 4

- Explain how changes to habitats—natural or human-made—can threaten living things.
- Describe how sustainable choices (e.g., reusing materials, conserving energy) help protect environments.
- Classify materials according to whether they can be reused, recycled, or have environmental consequences.
- Collect and interpret data about environmental issues (e.g., litter surveys, plant growth in different conditions).

Science Progression Map – Sustainability

Year 5

- Explain how human activity contributes to environmental issues such as pollution, deforestation, and climate change.
- Evaluate the benefits and drawbacks of renewable and non-renewable energy sources.
- Describe sustainable practices in everyday life and provide reasons for choosing them.
- Use scientific enquiry to test ideas related to sustainability (e.g., insulation experiments, water conservation tests).

Year 6

- Explain the relationship between human activity, climate change, and biodiversity loss using scientific vocabulary.
- Critically evaluate how sustainable technological or scientific solutions (e.g., solar panels, biodegradable materials) help address environmental challenges.
- Analyse data and draw conclusions about environmental trends, impacts, and possible interventions.
- Propose practical, evidence-based actions for improving sustainability at school or in the community.