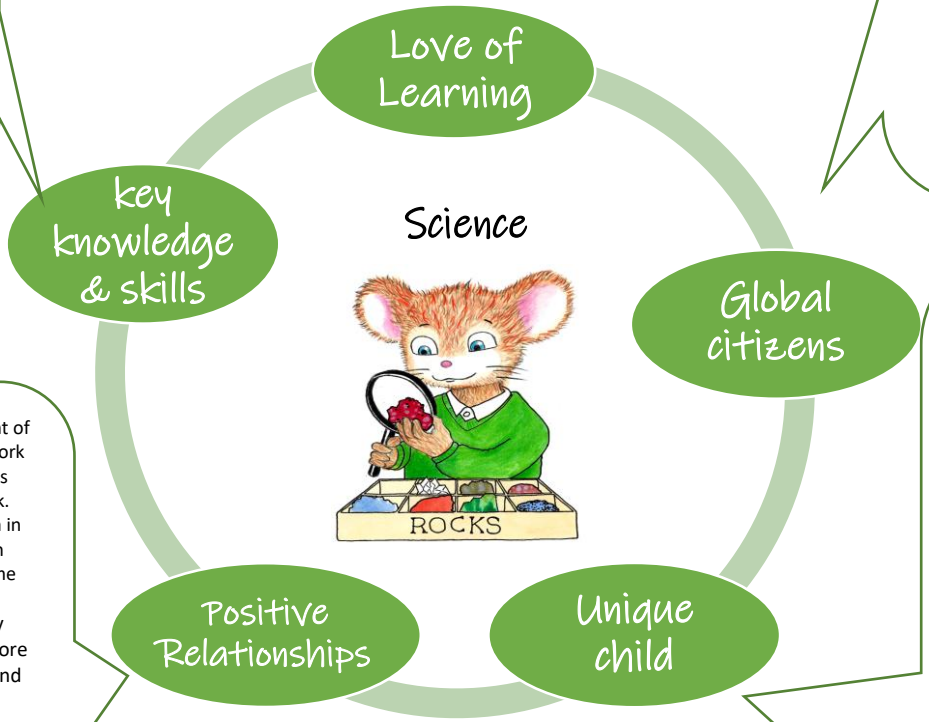
Science at Meadows First School (Vision and Ethos)

The 5 principles of our curriculum are: ***Unique Child, Positive Relationships, Key Knowledge & Skills, Love of Learning, Global Citizens*** *We embed these 5 principles within our* ***Science Curriculum*** *as follows:*

Our **theme- based, literature rich** curriculum embeds deep learning, ignites curiosity and broadens our children's awareness of cultural capital in Science.
Our enrichment opportunities in Science develop pupils' curiosity and interest in the subject. Throughout their time at Meadows, children have the chance to visit farms in Reception and Year 1 , visit the River Severn in Year 4 to learn about habitats and states of matter and in Year 3 take trip to the Botanical Gardens when learning about plants. Throughout the year we have many visitors to help children think scientifically including the Animal Man in Year 1, Pure Gym visit in Year 2 and Severn Trent Water in Year 4. We want children to develop a thirst for learning by using memorable and purposeful learning experiences. For example, every year the entire school will take part in British Science. This week helps children to understand the real life links between all the STEM subjects as well as inspiring children to become scientists in the future.

We want our children to use the vibrancy of our great country, to learn from other cultures, respect diversity, and appreciate what they have. We achieve this by providing a strong SMSC curriculum, with British Values and our core values placed at the heart of everything we do. This feeds into the Science curriculum We want children to feel empowered to make a difference and affect changes as **global citizens** to their community and the world in which they live. For example, children will learn about the harmful effects of global warming, deforestation and climate change. They will also learn about the benefits of recycling and renewable energy sources. In every Science unit, children learn about different scientists related to the topic they are studying. Our aim is to raise awareness of diversity in science-related jobs and to provide illustrated examples of a wide range of science-based careers.

We equip children with the Science **skills, vocabulary and knowledge** necessary for the next stage of their learning journey. Knowledge and skills are sequential and built upon to develop progress in Science across the school. Vocabulary development plays a vital role in this. We want children to be able to use Science as a means for communication and to use language skilfully. For example children can form predictions and explain their reasoning using scientific vocabulary. Similarly, children will also be able to analyse and draw conclusions from experiments and investigations clearly and precisely.



The Science curriculum at Meadows supports the development of positive, respectful relationships. We encourage children to work together in Science, supporting and encouraging each other, as well as reflecting on and critically evaluating each other's work. We enable parents to support their children by involving them in their education and inviting them into school: eg during British Science week children will be given projects to work on at home alongside their parents.
Life in 21st Century Britain can be busy and stressful and by allowing children time to be immersed in Science and explore the richness of the world around them can aid wellbeing and reduce stress
We know how to keep ourselves safe in Science, using equipment carefully and safely. We are proud of what we can achieve!

At Meadows First School we can all become Scientists! We develop the holistic child, acknowledging their unique needs and ensuring all children are able to access the Science curriculum. We support all of our children with a range of equipment that caters for all needs. In Science work is always scaffolded to meet the needs of all learners. Children are encouraged to apply their scientific knowledge and skills in a range of different contexts.
Children use meadows Mouse to develop lifelong learning habits to be;
Enthusiastic: to ask questions about the world around them and to come up with ways of investigating their ideas.
Determined: We encourage a growth mindset, with high expectations, so children are capable of achieving in science. We encourage children never to give during scientific investigations and experiments and reflect critically on their learning.
Focused: We want them to have no ceiling to their achievements and to grow up wanting to take up a career in a science related field.
Organised: We aim for our children to be independent and confident to use equipment safely as well as selecting the right equipment for the right piece of work.
We are proud of what we can achieve!

Science Topic Overview

Year Group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Nursery	Marvellous Me	Celebrations	Machines	My Wonderful World Nature	My Wonderful World People	Fantasy Fun
Reception	Marvellous Me	Heroes	Around the World	Around the World and Beyond	All Creatures Great and Small	Once Upon A Time
Year 1	My Body	Everyday Materials	Identifying Animals		Identifying Plants	
	SEASONAL CHANGES					
Year 2	Living in Habitats	Exploring Everyday Materials	Growth and Survival		Growing Plants	
Year 3	Light and Shadow	Health and Movement	Forces and Magnets	Rocks, Fossils and Soils	How Plants Grow.	
Year 4	Living in Environments	States of Matter	Eating and Digestion		Circuits and Conductors	Changing Sound.

Working Scientifically Progression Map.						
Working Scientifically	*EYFS*	*Year 1*	*Year 2*	*Year 3*	*Year 4*
1. Asking Questions. 	Shows curiosity about objects, events, plants, people and animals. Questions why things happen. Asks questions to clarify understanding and aspects of their familiar world e.g. place they live or natural world. Ask questions to find out how things work or to clarify what is happening	Explore the world around them and raise own questions. (e.g growing, animals in their habitat, everyday materials, why seasons change.) Can answer questions supported by the teacher, often through scenarios and recognise questions can be answered in different ways. Can begin to ask simple questions and use simple secondary sources to find answers. Able to ask yes and no questions to sort and classify	Raise questions that help them become familiar with scientific processes (e.g life processes that are common to all living things, their local environment, materials) Can ask simple questions relevant to the topic. Can use a range of question stems. (e.g. Is a flame alive? Is a deciduous tree dead in winter? What makes the best habitat for a minibeast? Where in the school can we find something that is made of wood? Which animal belongs to which offspring? Do seeds grow quicker inside or out?) Know their questions can be answered in different ways. Use more than one secondary source to gather and present information clearly.	Raise own questions about the world around them and why this happens the way they do (e.g. the role of the roots and stem in nutrition and support, or how rocks are formed, different forces) Recognise how and when to use secondary sources to answer questions that cannot be answered in practical science. Can write a range of questions relevant to the topic. Can answer questions posed by the teacher, independently or with support. Identify new questions from data. Can raise questions and carry out tests with support to find things out. Can carry out research using a small range of secondary sources.	Can decide how to gather evidence to answer questions. Raise questions to help identify and group (such as how a habitat changes, animals and living things including plants, different states of matter and how sounds are made) Can write a range of questions using the world around them and their own scientific knowledge. They recognise when secondary sources can be used to answer questions and can select appropriate information from sources. Can ask a range of questions to sort and classify.
2. Interpreting and Conclusion 	Offer explanations for why things happen- making use of some recently introduced scientific vocabulary. Develop own narrative and explain by connecting ideas or events. Develop vocabulary which meets the breadth of their experiences	Can use evidence from simple tests when answering questions. With help begin to notice patterns and relationships. Talk about what they have found out and how they found it out. Can make comparisons and recognise biggest/smallest, most effective/least effective from data.	Communicate findings to an audience using relevant scientific language and illustrations. Can identify casual relationships and patterns in results. Can identify which results do not fit the overall pattern and explain findings. Refers to the table of results when describing what has happened. Draws a basic conclusion (with support from the teacher) using own scientific knowledge, observations and comparisons. Uses results of investigations to answer enquiry questions.	Begin to look for naturally occurring patterns and relationships from data. Draws conclusions based on observations. Can compare something using results and the conclusion is consistent with the data. Able to adjust opinion and predictions based on results. Can give reasons for results including any anomalies. Uses findings and results to answer questions raised. Use simple scientific language to discuss ideas and communicate their findings in ways appropriate for different audiences orally and written.	Draws simple conclusions from results to answer questions and support their ideas. Look for casual relationships in data and identify evidence that refutes/supports ideas. Report on findings to an audience orally and in writing using appropriate scientific vocabulary for a range of audiences. Children use evidence to suggest values for different items tested using the same method. Draw conclusions based on straightforward evidence and current subject knowledge to support their findings, Suggest improvements and raise further questions.

Planning Enquiries 	Find ways to solve problems/find new ways to do things. Test out ideas. Take risks through trial and error. Engage in open ended activities. Choose the resources they need for their chosen activity from their environment.	Begin to recognise different ways they may answer scientific questions. Experience different types of enquiry including practical activities. Use practical resources provided by the teacher. Can carry out simple tests to classify, compare or pattern seek	Carry out simple comparative tests using own ideas (May use Discovery Dog model) Experience different types of enquiry including practical activities. Within the planning frame can suggest resources they may need for the test. Can carry out simple tests linked to the types of enquiry: observation, testing, pattern seeking, identifying and classifying and research.	Perform a range of scientific investigations including different types of scientific enquiry. Set up practical enquiries: comparative, and fair tests. Children investigate and answer questions linked to shared planning Frame (could be discovery dog) Understand there are different variables to be controlled. (Can identify some variables e.g. what was changed and what was kept the same) Follow basic instructions scaffolded by the teacher to conduct investigation.	Follow a plan to carry out observations and tests. Can select from a range of resources to gather evidence and answer questions, to classify, compare and perform fair tests. Use a planning approach (discover dog, post it planning) with more independence in identifying variables and what needs measuring. Children may choose their method to carry out the investigation
Making Predictions 	Shows curiosity about objects, events and people. Question why things happen. Can make simple predictions based on comparisons e.g. float or sink?	Can make basic predictions over things they can see or their own ideas. Can use some scientific vocabulary.	Draws on knowledge from observations to make a prediction. Can begin to test predictions and later answer questions (predictions can be a guess). Ask questions about what might happen in the future.	Uses evidence and subject knowledge to refute statements. Make predictions from questions posed. Add detail to their predictions giving reasons linked to own scientific knowledge. Makes further predictions from what is observed or tested.	Use subject knowledge or research to make predictions. Predictions are detailed and explains their thinking, they link to previous tests and use scientific language. Raise further predictions from results based on patterns. Make predictions for new values.
Evaluating 	Develop own narrative and explanations by connecting ideas or events. Talk about what they have found and say what worked well. Describe how things work in simple terms and make basic alterations and suggest things that did not work (e.g. this button does not work so press this one) Question why things happen. Come up with alternative ways of doing things through exploration.	With scaffolding and prompting can suggest simple improvements to their enquiries (orally). Talk about some changes that could be made.	With support can suggest improvements to their enquiries. Suggest some things that could be changed and evaluate why things went wrong.	Suggest improvements and raises further questions Use evidence and subject knowledge to refute statements. Make suggest improvements from enquiries. Make basic statements about what worked well and what they would change.	Evaluate and communicate their methods and findings. Suggest ways to improve what they have already done. Begin to evaluate different aspects of their enquiries such as equipment. Begin to understand how the enquiry improves outcomes from their questions

Recording 	Draw pictures of objects in their own environment. Can take photos of things of interest to them. As a class or in groups, can complete a table (adult led) count results. Start to mark make to record results. Can order items Can sort in more than 2 groups using familiar categories. Can create a class chart using pictures and objects.	Begin to show accuracy drawings, observations and simple labels. Use key scientific vocabulary provided by the teacher. Can complete a simple table of results. (prepared). Can add marks to a chart to collect data. Can use sorting rings to classify in more that 2 groups, answering yes and no questions. Can use a simple 2 criteria Venn diagram. Can complete a prepared a block graph/ Pictogram	Children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. Record findings using scientific language. Gather and record data to help in answering questions. Use prepared tables. Children record in different ways (including tally charts) Can identify and classify. Use simple keys based on yes and no questions. Can sot into two groups explaining their reasons clearly. Can record using prepared vertical charts. Can use results from tally charts.	Record finding using scientific language, drawings and labelled diagrams and with support chn write explanations based on observations. Can complete a table (with given template)where they add headings and results. Can use a venn diagram with 2 sorting criteria and 1 intersecting. Begin to use carroll diagrams . Can gve reasons for their sorting criteria. Can produce bar charts adding own labels and bars	Record findings using systematic observations and labelled diagrams. Detailed written observations based on observations. Can create their own tables with their own headings. Use classification keys to identify, classify and describe. Can use discrete and continuous data and present it In bar chart/line graph.
Observation and Measurement 	Explore the natural world making observations (e.g seasons) Explore different equipment, finding out what its uses are. Know similarities and differences between the natural world around them. Observe and describe what they see using everyday language. Use basic equipment such as magnifying glasses and viewers. Take measurements initially by comparisons then begin to use non-standard units. Make links and notice patterns in their experiences.	Uses appropriate senses aided by equipment such as magnifying glasses and viewers. With help and prompting, observe changes over time and can describe the changes. Can identify and group, compare and contrast using observations, video and photograph Use discrete e.g., counting and continuous data e.g. liquid to manageable common standard units. Can use simple measurements and equipment such as hand lenses and egg timers to gather data. Can use non-standard measures to compare	Observe closely, using simple equipment with greater precision. Can identify a variety of plants, animals and materials using observations. May use ID charts with support. Use their observations and ideas to suggest answers to questions. Observe through video, first-hand observations and measurement how different animals including humans grow and offer explanations. Compare objects based on observable features Observe how different plants grow and record findings including similar plants at different stages of growth and notice similarities and differences Use standard units to estimate and measure length, height, temperature, and capacity. Can use rulers, scales and measuring vessels with some degree of accuracy. Make decisions about what measurements to use and how long to make them for.	Make systematic and careful observations. Select own equipment for observing e Look for naturally occurring patterns and relationships. Collect data from their own observations and measurements. Closely observe stages of plant lifecycle over a period of time, noting patterns. Observe how water is transported in plants. Observe patterns in the way magnets behave in relation to each other. Can make observations and decide how to record them to answer a question. Take accurate measurements using standard units, can measure and compare. (e.g., amount of liquid and height of a plant to nearest ½ cm) Use a range of equipment for measuring time, length, capacity and temperature. Begin to use a range of scales. Can read digital measurements from data loggers appropriately	Make systematic and careful observations to identify plants and animals in their habitats and how the habitat changes throughout the year. Use observations to ask questions and group objects using classification keys. Observe closely and describe processes such as changes of state. Observe and record evaporation over a period of time. Identify differences, similarities or changes related to simple scientific ideas or processes. Uses a range of scales. Takes and records accurate measurements using standard units. Can record measurements to 2dp. Use thermometers to explore the effects of temperature on substances. Use data loggers to record sound in decibels and notice patterns. Use volt metres to measure voltage in a circuit to observe patterns and answer questions. Begin to gather repeat readings to increase accuracy.

Scientific Knowledge

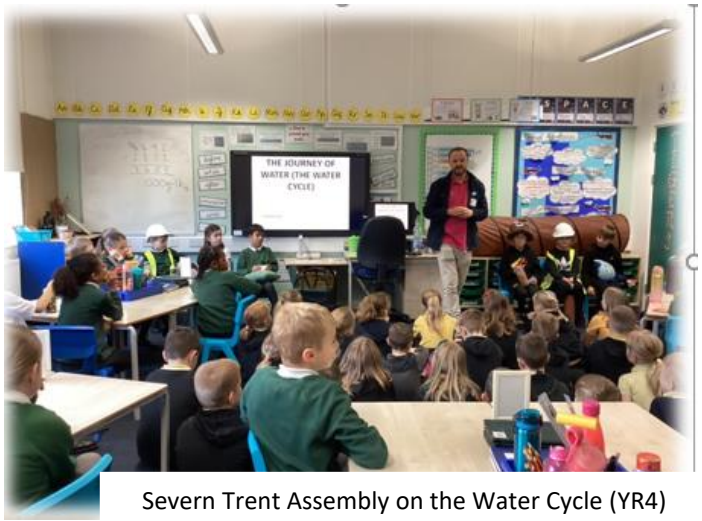
	EYFS	Year 1	Year 2	Year 3	Year 4
Plants	Explore the natural world around them, making observations and drawing pictures of animals and plants Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things.	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	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	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)	Explore the natural world around them, making observations and drawing pictures of animals and plants Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things. • Describe what they see, hear and feel whilst outside.	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	Understand that animals, including humans, have offspring which grow into adults 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	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	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.
Everyday Materials	Explore materials with different properties. • Explore natural materials, indoors and outside Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Talk about the differences between materials and changes they notice. Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	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.	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.		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

Living Things and their habitats	• Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Recognise some environments that are different to the one in which they live.		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		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.
Seasonal Changes	Understand the effect of changing seasons on the natural world around them	Observe changes across the four seasons - observe and describe weather associated with the seasons and how day length varie			

Rocks				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	Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.			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	Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.			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 - 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.	

Sound					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	Explore materials with different properties. • Explore natural materials, indoors and outside. Explore collections of materials with similar and/or different properties. • Talk about what they see, using a wide vocabulary				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. - 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. 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.

Science Enrichment



Severn Trent Assembly on the Water Cycle (YR4)

Pure Gym Visit – Exercise (YR2)

Year 4 Visit to Severn Valley Country Park (States of Matter)

Nutrition with Idris the Chef (Nutrition)

Wildlife Assembly (Year 1)

World Bee Assembly (Year 3)

Reception Visit to Atwell Farm

Year 3

THE BIRMINGHAM BOTANICAL GARDENS

AN EDUCATIONAL CHARITY

British Science Week

Year 1 Visit to Lower Smite Farm

Worcestershire Wildlife Trust

Lower Smite Farm

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ACCESS TO EDUCATION