Godmanchester Bridge Academy

How we teach Science

This document outlines: the intent and rationale behind our Science curriculum, how it is delivered it and how we measure pupil progress.

Intent

At Godmanchester Bridge Academy, the Science curriculum is aligned with our school values:

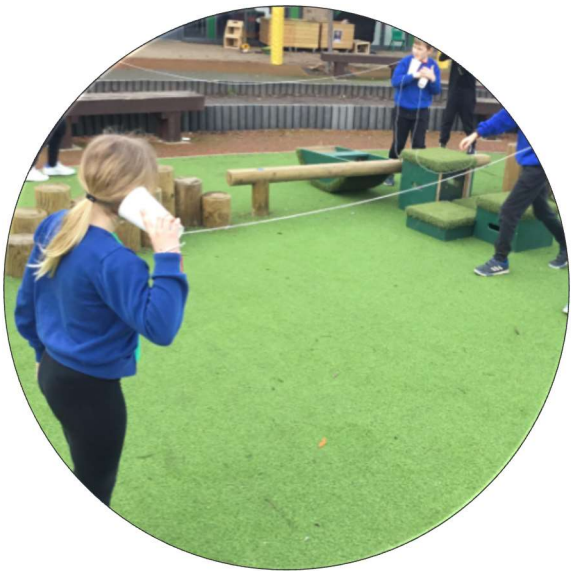
Inspire	Enjoy	Achieve
Children will have their curiosity stimulated as a scientist, to find out why things happen in the way they do. Our children will learn to ask and answer scientific questions and begin to appreciate the way in which science will affect their future on a personal, national, and global level.	Children will be able to apply their knowledge of Science through experiments, building arguments and explaining the reasoning for their findings. Children will be encouraged to be creative in their approach to the subject and gain enjoyment from their developing appreciation of the natural world.	Children will acquire and develop key scientific knowledge, conceptual understanding and enquiry skills throughout the programmes of study. All learning is accessible for all children regardless of their ability or background and by the time they leave our school, they will be equipped as scientists to apply their understanding in everyday life.

Godmanchester Bridge Academy is committed to providing a comprehensive and engaging science curriculum that fosters curiosity, critical thinking, and a lifelong love for learning. This aims to foster scientific inquiry, develop scientific literacy, promote cross-curricular connections and emphasise practical applications.

Our scheme is written by the subject lead and supports pupils to meet the National curriculum end of key stage attainment targets. It is designed to give pupils every opportunity to develop an understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer specific questions about the world around them, while giving them the ability to apply previously acquired concepts, skills and knowledge to new situations.

Our scheme aims to encourage children to gather and collate relevant evidence, to questions outcome and to persevere and develop a scientific approach to problem solving by encouraging questioning, a willingness to investigate, a tolerance of uncertainty, open-mindedness and critical reflection.

We aim to give a range of opportunities to relate science to everyday life through the use of everyday materials, technology and experiences; encourage an awareness of continuing scientific advances and their impact on society, both personally/close to home and globally and help all children realise their potential in science at primary school, thereby enabling them to take full advantage of science in secondary school and beyond.



Implementation

The Science scheme of work delivered through sequential lessons, allowing children to build their skills and knowledge, and apply them to a range of outcomes. Working scientifically skills, a key part of the National Curriculum, are also woven throughout every unit.

Units in each year group will cover topics throughout 3 core areas:

- Biology
- Chemistry
- Physics

The Science units cover each of the National curriculum attainment targets and are planned to allow flow to children's learning, progressing their knowledge and skills. These skills develop to ensure that attainment targets are securely met by the end of each key stage. The units fully scaffold and support essential and age appropriate, sequenced learning, and are flexible enough to be adapted to form cross-curricular links with our larger curriculum.

Science lessons are inquiry led and focus on using scientific language to communicate children's findings and ideas. Scientific vocabulary is explicitly taught to allow scientific concepts to be articulated clearly and precisely. Answers to questions are sought through careful observations; collecting accurate data, then analysing and presenting findings is achieved using scientific equipment while performing comparative and fair tests.

When planning and teaching science, our teachers utilise a number of resources to ensure that our science curriculum is both progressive and aspirational and to also ensure that our children develop the ability to work scientifically both whilst gaining and rehearsing new knowledge and also during assessment opportunities. Wherever possible the Science curriculum is enriched through whole school events, projects and experiences. The subject lead ensures cross curricular links through the use of Science skills and knowledge to celebrate and recognise significant events in the year.

The Science curriculum is designed in such a way that children develop their substantive and disciplinary knowledge which then further drives their scientific skills and work.

Curriculum Accessibility – Science

All Pupils:

- access a differentiated curriculum designed by the subject leader that is appropriate for all but is also meaningful, challenging & ambitious.
- are provided a range of activities to engage them and allow them to effectively communicate their understanding.
- are closely monitored and supported pastorally to ensure their emotional wellbeing is prioritised.
- named on each lesson seating plan so that pupils are known to staff and we foster a feeling of each pupil having their own place in the community.
- record work in a variety of ways, allowing access to the curriculum through multi-sensory learning.
- are provided with subject knowledge organisers.
- are supported with their behaviour choices in a therapeutic environment, school use restorative practise so that pupils can reflect and be supported to meet the schools valued behaviour expectations.
- Experience effective questioning to deepen knowledge and understanding and provide challenge
- receive feedback in lessons that results in further progress across the curriculum.

Some Pupils Need:

- use of concrete and pictorial representations during teaching and when working independently to aid their understanding.
- clear vocabulary explanations and/or introductory vocabulary work to prepare for a task.
- targeted questioning to support pupils in answering questions both orally and in written work.
- one-to-one interaction and targeted intervention by the teacher or support staff.
- a specific seat in lessons to meet a sensory or a learning need.
- specific feedback.
- an effective blend of co-operative, independent and teacher-led activities to appropriately challenge and support.
- key words and vocabulary identified and discussed.
- sentence starter/writing frames a scaffolded lesson structure, e.g. additional modelling, more paired/ discussion work or increased mini-plenaries.
- extra support in a lesson from an additional adult so that the pupils needs, academic or pastoral, are effectively met.
- post teaching to address any misconceptions.

Specific Pupils Need:

- access to a quiet space to ensure they can be supported to meet their potential.
- additional support in lessons from an adult who is attuned to their individual pastoral and learning needs.
- bespoke timetables taking in to account their needs to ensure that they are taught in an environment that best supports their pastoral and learning needs.
- curriculum adaptations to allow for engagement through pupil interests (project focus or word problem context).
- additional support in practical lessons.
- a personalised learning pathway.

Impact

The impact of the scheme is constantly monitored through both formative and summative assessment opportunities. Each lesson includes assessing pupils against the learning objectives. An assessment spreadsheet for children with secure understanding and those working at greater depth enables teachers to keep records of summative assessments for each child. These are reviewed and monitored by subject leads each term and informs future adaptations to the curriculum and planning.

After the implementation of the Science scheme, pupils should leave primary school equipped with a range of skills and knowledge, and the confidence to form a strong foundation for their Science learning at Key Stage 3 and beyond.

The expected impact of following the Science scheme of work is that children will:

★ Demonstrate a love of science work and an interest in further study and work in this field.

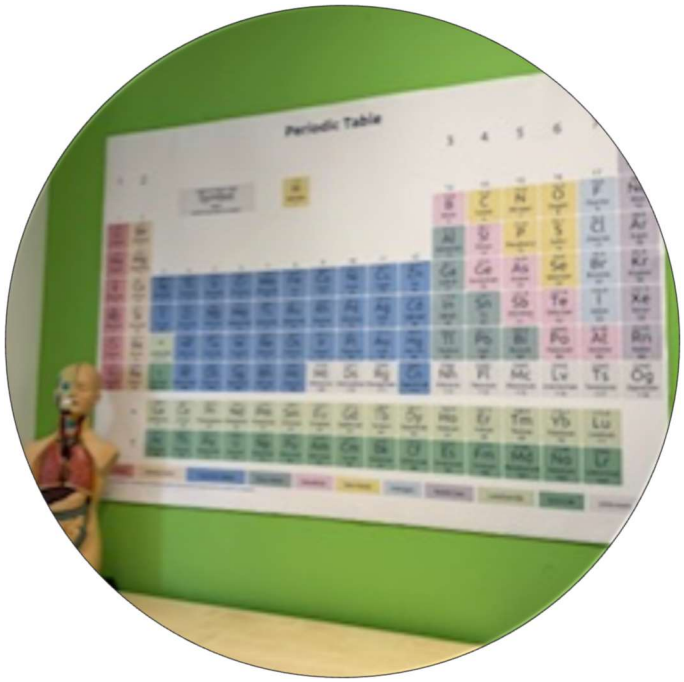
★ Retain Science knowledge with a real life context.

★ Be able to question ideas and reflect on their knowledge.

★ Be able to articulate their understanding of scientific concepts and be able to reason scientifically using rich scientific language.

★ Work scientifically to investigate and experiment, and organise, record and interpret the results of their investigations.

★ See themselves as scientists!



Subject Map

*Diversity is addressed in every unit of science – as part of making sure children realise that they too are scientists when learning Science, scientists and key researchers from differing backgrounds relating to each unit are introduced at the start of each topic.

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
R	**Woodland animals and plants.**	**Hibernation and migration.**	**Earth, Sun, Moon, planets and stars. Space travel. Dinosaurs and fossils.**	**Signs of Spring. Growing and planting. Pollution (impact on water) and sea creatures.**	**Materials. How to take care of themselves.**	**Sun and water safety. Shadows and rainbows.**
	Explore seasons outside.					
Substantive and disciplinary knowledge and working scientifically	Understand what a habitat is, what it looks like and how it is suited to each animal and plant. Understanding that the trees change at different times of the year. Observation skills, drawing and building what they observe, discussions and questioning based on observations.	Understand what hibernation and migration are and which animals do what. Understand when migration and hibernation might take place and why. Role play different animals during hibernation and migration time. Creating hibernation den for different animals.	Understand what an asteroid is. Name and order the planets. Understand the different diets of dinosaurs, predators and prey, the life of a dinosaur and key facts. What ended the dinosaurs. Understanding there are different types of fossils. Practical demonstrations and observations of asteroids. Observations of planetary models. Creating dinosaur fossils. Observing different dinosaur	Understanding key changes to plants and trees in Spring and how this correlates to the changes in weather. Understanding the negative impact of pollution, its different types and positive steps to reduce it. Looking at the growth of different plants and animals. Measuring plants, looking at how plants grow and recording growth through discussion, pictures and models.	Understand the importance of healthy eating and exercise. Understanding different properties of materials that make them useful for different things. Design cloaks for little red riding hood and houses for the three little pigs, testing observing and recording the results with different materials.	The importance of wearing suncream, appropriate clothes to wear in the sun. Understand how to stay safe in water and the dangers of water. Shadow drawing and how shadow change and move. Observing shadows, shadow drawing, role play, discussions about sun and water safety.

			footprints and guessing dinosaurs based on key clues.			
Fieldwork	Explore seasons.	*Explore seasons. Local walk to observe animals locally that would migrate or hibernate.*	Explore seasons.	Explore seasons.	Explore seasons.	*Explore seasons. Looking at the local river to understand how to stay safe around water.*
1	**Everyday materials**		**Animals including humans**		**Seasonal changes**	**Plants**
Substantive and disciplinary knowledge and working scientifically	Distinguish between objects and materials. Identify, compare and group together materials and their physical properties. Explore and experiment with a variety of different materials, performing simple tests to explore questions. Constructing objects from different materials.		Identify, describe, and compare the structure of animals including fish amphibians, reptiles, birds and animals and classify them as carnivores, herbivores and omnivores. Identify and label basic parts of the human body associated with each sense. Use observation skills to compare and contrast, describing how to identify and group items. Explore objects using different senses.		Observe changes across the seasons and describe the weather and day length associated with them. Making tables and charts about the weather and day length.	Identify and describe the structure of common plants and trees. Examining and observing plants. Growing plants from seeds. Use observation skills and magnifying glasses, drawing diagrams. Recording changes to plants over time.
Fieldwork	*Collecting some natural materials from outdoors to include in experiments.*		*Explore and answer questions about animals in the local habitat.*		*Explore local environment in different seasons to observe changes.*	*Explore local environment explore plants growing in their habitat.*
2	**Animals including Humans**	**Living things and their habitats**	**Uses of everyday materials**		**Plants**	
Substantive and disciplinary knowledge and working scientifically	Describe the needs of animals for survival and the importance for humans of exercise, diet, and hygiene. Notice that animals have offspring which grow into adults.	Explore and compare living, dead and things that have never been alive. Describe how most living things live in habitats suited to them. Identify and name plants and animals in their	Identify and compare suitability of materials and find out how shapes of solid objects can be changed. Comparing the uses of materials in and around school with materials found elsewhere, observing closely, identifying and classifying the uses of materials and recording observations.		Observe and describe how seeds and bulbs grow into mature plants. Describe how plants need water, light and a suitable temperature to grow and stay healthy. Observing and recording the growth of a variety of plants as they change from a seed/bulb, observing plants at different stages of growth. Setting up comparative tests for light and water in plant growth.	

	Observing and measuring the growth of different animals.	habitats and describe the idea of a food chain. Sorting and classifying (living, dead, never alive), recording findings using charts.				
Fieldwork		*Study a variety of plants and animals in our local environment.*	*Collecting materials from the school and local environment.*		*Use the local environment to observe how different plants grow – thinking about how plants reproduce, grow and survive.*	
3	**Forces and magnets**		**Rocks**	**Animals including Humans**	**Light**	**Plants**
Substantive and disciplinary knowledge and working scientifically	Some forces need contact but magnetic forces can act at a distance. Compare and group materials based on magnetism. Describe magnets as having two poles and predict if two magnets with attract or repel each other. Observe how magnets attract and repel. Compare how things move on different surfaces. Carrying out tests to answer questions. Exploring strength of different magnets and finding a fair way to compare them. Sorting objects into those that are magnetic and those that are not.		Simply describe how fossils are formed and recognise soils are made from rocks and organic matter. Compare and group types of rocks based on appearance and physical properties. Observing rocks using hand lenses or microscopes. Researching different fossils.	Animals need the right types and amount of nutrition and that they cannot make their own food. Identify that some animals, including humans, have skeletons and muscles for support, protection, and movement. Grouping animals with and without skeletons and observing and comparing their movement. Compare and contrast diets of different animals. Researching food groups.	Recognise light is needed in order to see things and dark is the absence of light. Notice that light is reflected from surfaces and that it is important to protect our eyes from dangerous sunlight. Recognise that shadows are formed when light is blocked by opaque objects. Find patterns in the way the size of shadows change. Measuring shadow sizes and observing shadows to determine properties of objects.	Identify and describe functions of parts of plants, explore requirements of plants for life and growth, investigate water transportation in plants, explore the role of flowers in the life cycle. Comparing effects of different factors on plant growth, looking for patterns in fruit structure and the impact of seed dispersal, observations of water transport.
Fieldwork			*Looking at rocks in our local environment.*	*Observing animals in their habitats and their food sources and movement types.*		*Observe local plants and understand how their needs are met in their habitat.*

4	States of matter	Electricity	Sound	Animals, including Humans	Living things and their habitats
Substantive and disciplinary knowledge and working scientifically	Compare and group materials by state. Observe the materials can change state when heated or cooled and measure and research the temperature that this happens at. Identify the role of evaporation and condensation in the water cycle. Investigate, observe, and record the rate of evaporation with temperature. Grouping and classifying materials, exploring effects of temperature on different substances. Research the temperature at which materials change state.	Identify electrical appliances, construct a simple series electrical circuit, identifying its basic parts. Identify if a lamp will light in a series circuit, recognising that switches open and close. Recognise common conductors and insulators. Observe that bulbs get brighter with more cells and metals tend to be good conductors.	Identify how sounds are made and associate them with vibrations through a medium to the ear. Find patterns between pitch and the object producing the sound and volume and the strength of vibrations. Recognise that sounds get fainter with distance. Finding patterns in sounds made by different objects. Make earmuffs from different materials for sound insulation.	Describe simple functions of the basic parts of the human digestive system. Identifying different types of human teeth and their functions. Identify producers, predators and prey in food chains. Comparing teeth of carnivores and herbivores and suggesting differences. Draw and discuss ideas about the digestive system.	Explore and use classification keys to group, identify and name living things in the local and wider environment. Recognise that environments can change and that this can pose dangers to living things. Using and making simple keys to explore and identify local plants and animals. Create guide to local living things.
Fieldwork			*Collect materials from nature to experiment with sounds.*	*Look at food chains from animals in our local environment.*	*Explore humans impact (positive and negative) on the local environment).*
5	**Earth and space**	**Forces**	**Properties and changes of materials**	**Living things and their habitats**	**Animals including humans**
Substantive and disciplinary knowledge and working scientifically	Describe the movement of 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, Moon and Earth as approximately spherical bodies. Use the Earth's rotation toe explain day and night and the movement of the sun across the sky. Compare time of day at different places, create simple models of the solar system. Construct simple shadow clocks and sundials.	Explain the unsupported objects fall towards the Earth because of the force of gravity. Identify effects of air resistance, water resistance and friction between moving surfaces. Recognise mechanisms including	Compare and group together materials based on properties. Know that some materials dissolve to form a solution and how to reverse this process. Demonstrate the dissolving, mixing and changes of state are reversible changes and	Describe the differences in the life cycles of mammals, amphibians, insects and birds. Describe reproduction in different animals and plants. Observe and compare life cycles in local	Describe changes as humans develop to old age. Researching gestation periods of other animals and comparing them to humans. Finding out and recording the length and mass of a baby as it grows.

	Research into Copernicus and Ptolemy and think about what led to their different conclusions. Create models of the phases of the moon.	levers, pulleys and gears and their effect. Explore falling objects. Design parachutes and carry out fair tests of their effectiveness. Investigate water resistance with boats of different shapes and design products using simple mechanisms.	that some irreversible changes result in new materials being formed. Give reasons, based on evidence from fair tests, for the uses of materials. Use knowledge of states of matter to decide how mixtures could be separated. Carry out tests to answer questions. Research and discuss how chemical changes impact our lives.	environment with others, Experiment with growing new plants with different parts f parent plants. Observe changes to animals over a period of time.	
Fieldwork	Visiting a planetarium. Visiting the space museum.		*Walk the local area looking at man made and natural materials.*	Zoo trip looking at life cycles. Butterfly farm.	*Look at the life cycles of plants and animals found locally*
6	**Light**	**Electricity**	**Living things and their habitats**	**Animals including humans**	**Evolution and inheritance**
Substantive and disciplinary knowledge and working scientifically	Understand that light travels in straight lines and use this to explain that objects are seen because they give out or reflect light into the eye and why shadows have the same shape as the objects that cast them. Decide where to place mirrors on cars, design and make periscopes, use shadow puppets to explore the relationship between lights sources, objects and shadows. Research into light phenomena including rainbows, colours on bubbles, objects looking different in water and coloured filters.	Associate brightness of lamps and volume of buzzers with number and voltage of cells used, compare and explain variations in how components function and on/off switches. Use recognised symbols in circuit diagrams. Systematically identifying the effect of changing single circuit components, designing traffic lights, alarm	Describe how living things are classified according to observable characteristics, giving reasons for classifications of plants and animals with specific characteristics. Use classification systems and keys to identify local animals and plants, research unfamiliar animals and plants from differing habitats deciding how to classify them.	Identify main parts and functions of the human circulatory system, recognising the impact of diet, exercise, drugs and lifestyle on the body. Describe the transport of nutrients and water in animals. Explore the work of different scientists and research about the relationship between diet, exercise, drugs, lifestyle and health. Create models of the circulatory system.	Recognise that living things have changed over time and fossils give evidence of these things from millions of years ago on Earth. Recognise that offspring normally vary and are not identical to their parents. Identify how animals and plants are adapted to their environment and that adaptation leads to evolution. Questioning how local animals are adapted to local environment

		systems and other useful circuits.			compared to those adapted to extreme conditions. Analyse how specific adaptations give advantages and disadvantages.
Fieldwork	*Using periscopes outside.*		*Local wildlife walk to classify local animals and plants*		*Local wildlife walk to observe adaptations in local environment.*

GBA adaptations