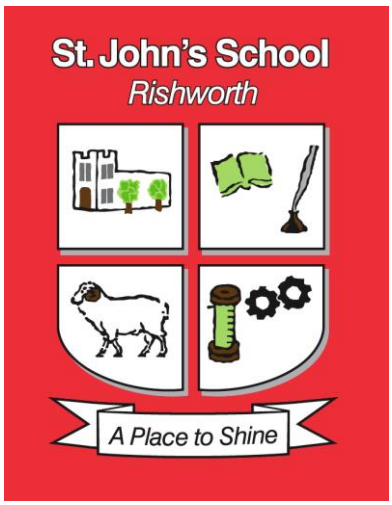

SCIENCE POLICY

Ratified by Headteacher	16th May 2019
Next Review (4yrs)	SUMMER 2021

The Vision of St John's CE Primary School, Rishworth

Matthew 5:16 (NRSV)

"Let your light shine before others, so that they may see your good works and give glory to your father in heaven."

Following Matthew 5:16, people shine through success, honesty, independence, neighbourliness and enjoyment. We believe children learn best when they're happy and have the confidence to respond to challenges, within a caring Christian environment where adults lead by example. We value the partnership with families and the community whilst striving to give our best.

The School's Aims are:

♦To maximise the academic attainment of each child

♦To maximise the personal, social, spiritual and physical development of each child

The pupils, staff, parents and governors of St John's have worked together to create **our core values:**

Success. We aim to provide excellent learning opportunities to ensure the best possible progress and attainment for all children whatever their needs and abilities.
Honesty. We aim to develop children's understanding of the importance of honesty in all relationships and as part of self-reflection in a Christian environment.
Independence. We aim to develop the self- confidence in all our children that enables them to think and work independently, so striving for excellence in all areas of the curriculum.
Neighbourliness. We aim to ensure that every child becomes a compassionate and respectful member of the school, local, national and global communities.
Enjoyment. We aim to be a safe, friendly and welcoming environment where children have exciting and creative learning experiences that help develop an enjoyment and love of learning.

AIMS AND OBJECTIVES

The new National Curriculum 2014 states why we teach science in schools:

'A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics...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.'

Through high-quality science teaching, we aim to help our pupils understand how major scientific ideas have played a vital role in society. Moreover, we aim to prepare our pupils for life in an increasingly scientific and technological world.

SCIENCE CURRICULUM INTENT

SELF - At this school we increase the scientific capital of all pupils so that they feel that science is an option for their future through direct learning experiences and enquiries.
OTHERS - We are proactive in exposing our pupils to people and companies in our local scientific community and teach them about the contributions of scientists from all over the world and throughout the ages.
WIDER WORLD - Pupils at St John's are taught that science is a subject with truly global reach. Our aim is to prepare them to be effective contributors to the pressing scientific issues of the future of our planet.

We aim to do this by following a set of principles which have been designed and reviewed by stakeholders (including pupils).

At St John's, science teaching should:

1) Be based on a secure knowledge of the subject
2) Be engaging and creative
3) Have a mixture of practical and written work
4) Have a strong real-life context
5) Be inspired by the questions that children have
6) Be challenging

TEACHING AND LEARNING STYLE

At St John's School, teachers plan and deliver high-quality and engaging science lessons incorporating a range of teaching and learning styles. Teachers will provide opportunities for pupils to:

- Learn about science, where possible, through first-hand practical experiences;
- Develop their research skills through the appropriate use of secondary sources;
- Work collaboratively in pairs, groups and/or individually;
- Plan and carry out investigations with an increasing systematic approach as they progress through the school;
- Develop their questioning, predicting, observing, measuring and interpreting skills;
- Record their work in a variety of ways e.g. writing, diagrams, graphs, tables;
- Read and spell scientific vocabulary appropriate for their age.
- Be motivated and inspired by engaging and interactive science displays which include key vocabulary and relevant questions.
- Learn about science using the outdoor learning environment.
- Develop their *Working Scientifically* skills to enable them to ask their own questions about the world they live in; design investigations to find the answers and evaluate the limitations of their work.
- Be involved in a science themed week once a year where pupil's work for the whole week will be based around real-world scientific context (supported by practical activities and visitors).
- Increase their scientific capital. ***Science capital*** *can be* ***defined*** *as the sum of all the* ***science****-related knowledge, attitudes, experiences and resources that an individual builds up through their life.*

SCIENCE CURRICULUM PLANNING

- We teach science in the Foundation Stage as an integral part of the topic work covered during the year.
- As the reception class is part of the Foundation Stage of the National Curriculum, we relate the scientific aspects of the pupil's work to the objectives set out in the Early Learning Goals (ELGs), which underpin the curriculum planning for children aged three to five.
- Science makes a significant contribution to the objective in the ELGs of developing a pupil's knowledge and understanding of the world, e.g. through investigating what floats and what sinks when placed in water.
- At Key Stage 1 and 2 teachers plan science lessons using the National Curriculum (2014).
- All science lessons have focussed learning objectives, clear differentiation and success criteria to ensure that pupils make at least good progress.
- **'**Working scientifically' is embedded throughout the areas of learning in key stage 1 and 2; this focuses on the key aspects of scientific enquiry which enable pupils to investigate and answer scientific questions.

- Areas of learning within key stage 1 and 2 ensure that statutory requirements are being covered through the specific disciplines of biology, chemistry and physics (teachers may also refer to the non-statutory guidance which provide additional support).
- The medium term Key Stage Plans map out the topics to be covered over the 2 year cycle in Key Stage 1 and a 4 year cycle in Key Stage 2.
- The short term plans are completed by all teachers and outline when lessons will be delivered. Science is a core subject of the National Curriculum and is taught every week.

ASSESSMENT AND RECORDING

EYFS: We encourage the *understanding of the world* of our pupils in Reception class as an integral part of their work. As Reception class is part of the EYFS, we relate the *understanding of the world* by the pupils to the objectives set out in the Early Years Outcomes which underpin the statutory requirements for children from birth to end of the Reception year. We give all pupils the opportunity to undertake activities that offer appropriate scientific challenge using a wide range of resources to support specific skills.

Key Stage 1: Teachers make ongoing, formative assessments of pupils' developing knowledge and understanding in science. Formative assessments are supported by focused assessments based on the TAPS scheme. These are reported to parents at parents' evenings throughout the year.
Teachers make an assessment of the children's work in science at the end of Key Stage 1.

Key Stage 2: Teachers make ongoing, formative assessments of pupils' developing knowledge and understanding in science. Formative assessments are supported by focused assessments based on the TAPS scheme. These are reported to parents at parents' evenings throughout the year.
At the end of Key Stage 2, children are assessed in science and the results of these assessments are reported to parents at parents' evening/in the annual report.

Monitoring and Training
Teaching, planning and book scrutiny are carried out regularly by the science subject leader and feedback is given to teachers at an appropriate time along with any training to address issues identified.
Training is delivered where possible, by the science leader or through external agency if not possible.
Teachers have access to and should undertake subject specific training before teaching each topic through the CPD website *ReachOut CPD*.

Working Scientifically Skills and Knowledge Progression
Children work to develop skills and knowledge in line with the National Curriculum 2014. Knowledge in KS2 is covered in a 4 year cycle rather than in the year based system suggested in the National Curriculum. For details of progression in both areas, see appendix 1 below.

Health and safety
- Teachers must plan safe activities for science and complete a risk assessment if necessary.
- Teachers and teaching assistants need to be aware of health and safety procedures when using equipment/food/substances in science lessons.
- Pupils must be aware of the need for personal safety and the safety of others during science lessons.
- Guidance can be sought through the most recent edition of "Be Safe" which is kept in the staff room.

Inclusion
At St John's teachers ensure that they adopt an inclusive approach to their science planning and teaching; ensuring that pupils of all abilities and backgrounds have an equal opportunity to make good progress and enjoy science.

Appendix 1

Working Scientifically Skills Progression

EYFS	Key Stage One
Show curiosity about objects, events and people Playing & Exploring Questions why things happen Speaking: 30-50 months	Explore the world around them and raise their own simple questions
Engage in open-ended activity Playing & Exploring	Experience different types of science enquiries, including practical activities
Take a risk, engage in new experiences and learn by trial and error Playing & Exploring	Begin to recognise different ways in which they might answer scientific questions
Find ways to solve problems / find new ways to do things / test their ideas Creating & Thinking Critically	Carry out simple tests
Develop ideas of grouping, sequences, cause and effect Creating &Thinking Critically Know about similarities and differences in relation to places, objects, materials and living things ELG: The World	Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying)
Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world The World: 30-50 months	Ask people questions and use simple secondary sources to find answers
Closely observes what animals, people and vehicles do The World 8-20 months Use senses to explore the world around them Playing & Exploring	Observe closely using simple equipment With help, observe changes over time
Make links and notice patterns in their experience Creating & Thinking Critically	With guidance, they should begin to notice patterns and relationships
Choose the resources they need for their chosen activities ELG: Self Confidence & Self Aware-ness Handle equipment and tools effectively ELG: Moving & Handling	Use simple measurements and equipment (e.g. hand lenses, egg timers) to gather data
Create simple representations of events, people and objects Being Imaginative: 40-60+ months	Record simple data
Answer how and why questions about their experiences ELG: Understanding Make observations of animals and plants and explain why some things occur, and talk about changes ELG: The World	Use their observations and ideas to suggest answers to questions Talk about what they have found out and how they found it out
Develop their own narratives and explanations by connecting ideas or events ELG: Speaking Builds up vocabulary that reflects the breadth of their experience Understanding: 30-50 months	With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language

Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Explore the world around them and raise their own simple questions	Raise their own relevant questions about the world around them	Use their science experiences to explore ideas and raise different kinds of questions
Experience different types of science enquiries, including practical activities	Should be given a range of scientific experiences including different types of science enquiries to answer questions	Talk about how scientific ideas have developed over time
Begin to recognise different ways in which they might answer scientific questions	Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions	Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions
Carry out simple tests	Set up simple practical enquiries, comparative and fair tests Recognise when a simple fair test is necessary and help to decide how to set it up	Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why
Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying)	Talk about criteria for grouping, sorting and classifying; and use simple keys	Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment
Ask people questions and use simple secondary sources to find answers	Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations	Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact
Observe closely using simple equipment with help, observe changes over time	Make systematic and careful observations Help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used	Make their own decisions about what observations to make, what measurements to use and how long to make them for
With guidance, they should begin to notice patterns and relationships	Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them	Look for different causal relationships in their data and identify evidence that refutes or supports their ideas
Use simple measurements and equipment (e.g. hand lenses, egg timers) to gather data	Take accurate measurements using standard units learn how to use a range of (new) equipment, such as data loggers / thermometers appropriately	Choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. Take repeat measurements where appropriate.
Record simple data	Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse this data	Decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Use their observations and ideas to suggest answers to questions Talk about what they have found out and how they found it out	With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions	Identify scientific evidence that has been used to support or refute ideas or arguments
With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language	Use relevant simple scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences, including oral and written explanations, displays or presentations of results and conclusions	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas, use oral and written forms such as displays and other presentations to report conclusions, causal relationships and explanations of degree of trust in results
	With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done.	Use their results to make predictions and identify when further observations, comparative and fair tests might be needed

Knowledge Progression KS1 – Science – St John's

Animals Including Humans 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.	**Materials** 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.	**Plants** 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.	**Seasonal Changes** Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies.
Materials Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Describe how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	**Plants** 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.	**Living Things & Their Habitats** 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.	

Knowledge Progression KS2 – Science – St John's

Plants 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.	**Light** Notice that light is reflected from surfaces. Recognise that he/she needs light in order to see things and that dark is the absence of light. Recognise that light from the sun can be dangerous and that there are ways to protect eyes. Recognise that shadows are formed when the light from a light source is blocked by a solid object. Find patterns in the way that the size of shadows change.	**Forces and Magnets** Compare how things move on different surfaces. Notice that some forces need contact between two objects but magnetic forces can act at a distance. Compare and group together a variety of everyday materials on the basis of whether or not they are attracted to a magnet, and identify some magnetic materials. Observe how magnets attract or repel each other and attract some materials and not others. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing.	**Rocks** Recognise that soils are made from rocks and organic matter. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.
Animals Including Humans Identify that humans and some other animals have skeletons and muscles for support, protection and movement. 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. Describe the changes as humans develop to old age	**Living Things and Their Habitats** 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	**States of Matter** 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	**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

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	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 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	associate the rate of evaporation with temperature	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

Light	**Evolution and Inheritance**	**Earth and Space**	**Forces**
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	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	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 the apparent movement of the sun across the sky	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

Properties and Changes of Materials	**Electricity**
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	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 Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit

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	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