RUSHEY GREEN PRIMARY SCHOOL

SCIENCE POLICY

Approved by:		**Date:**	May 2020
Signed:			
Last reviewed on:	May 2016		
Next review due by:	September 2022		

1. Curriculum Statement

"Our ability to generate new knowledge and use it innovatively depends upon having a scientifically literate population. And although people learn throughout their lives, good science education in schools is a vital preparation for scientific literacy in later life." ***Professor Ian Diamond, Science Education in Schools.***

Intent

The 2014 national curriculum for science aims to ensure that all children:

- develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics;
- develop understanding of the **nature, processes and methods of science** through different types of science enquiries that help them to answer scientific questions about the world around them;
- are equipped with the **scientific skills** required to understand the **uses and implications** of science, today and for the future. We understand that it is important for lessons to have a skills-based focus, and through this the knowledge can be taught.

At Rushey Green Primary School, we encourage children to be inquisitive throughout their time at the school and beyond. The Science curriculum engages children's natural curiosity about our universe and promotes respect for the living and non-living. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes. The children will acquire and develop the key knowledge that has been identified within each unit and across each year group, as well as the application of scientific skills. We ensure that the 'working scientifically' skills are built-on and developed throughout children's time at the school so that they can apply their knowledge of science when using equipment, conducting experiments, building arguments and explaining concepts confidently and continue to ask questions, solve problems and be curious about their surroundings.

We want children to learn the possibilities for careers in science, and aim to make links with local secondary schools and connect with national agencies such as STEM. This will allow children to learn from and work with professionals, ensuring that children have access to positive role models within the field of science from the immediate and wider local community. From this exposure to a range of different scientists from various backgrounds, we want all children to feel they are scientists and capable of achieving.

Implementation

Teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all children are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following;

- All classes teach Science first thing on Mondays to raise the importance of Science and to start the week with an inquisitive activity.
- Science will be taught in planned and arranged topics each term which build on knowledge and skills as the children move through the school.
- Through planning, teachers involve problem solving opportunities that allow children to apply their knowledge, and find out answers for themselves. Children are encouraged to ask their own questions and are given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge.
- Teachers use precise questioning in class to test conceptual knowledge and skills, and assess children regularly to identify those children with gaps in learning, so that all children keep up.
- We build upon the knowledge and skill development of the previous years. As the children's knowledge and understanding increases, and they become more proficient in selecting, using

scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence.

- Working Scientifically skills are embedded into lessons to ensure these skills are being developed throughout the children's school career and new vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years as topics are developed.
- Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding. Teachers find opportunities to develop children's understanding of their surroundings by accessing outdoor learning and workshops with experts.
- Children are offered a wide range of extra-curricular activities, visits, trips and visitors to complement and broaden the curriculum. These are purposeful and link with the knowledge being taught in class.
- Regular events, such as Science Week, allow all children to come off-timetable, to provide broader provision and the acquisition and application of knowledge and skills. These events may involve families and the wider community.

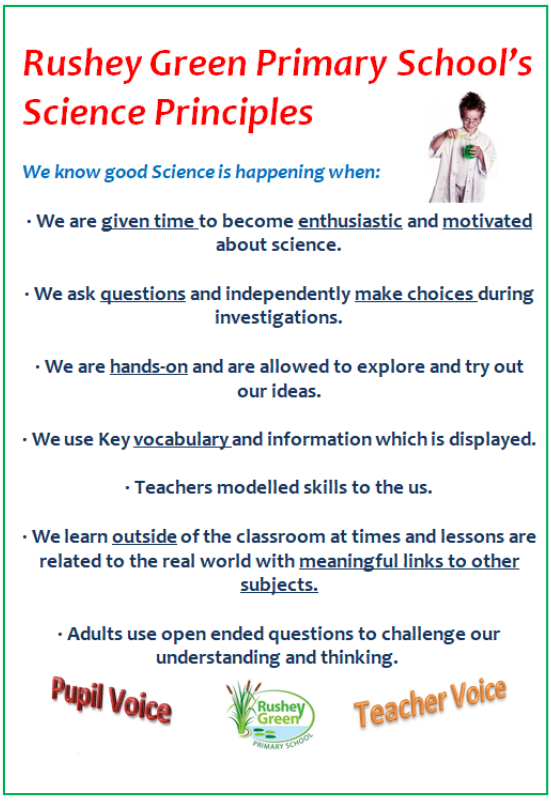
Impact

The successful approach at Rushey Green Primary School results in a fun, engaging, high-quality science education, that provides children with the foundations and knowledge for understanding the world. Our engagement with the local environment ensures that children learn through varied and first hand experiences of the world around them. Frequent, continuous and progressive learning outside the classroom is embedded throughout the science curriculum. Through various workshops, trips and interactions with experts, children have the understanding that science has changed our lives and that it is vital to the world's future prosperity. Children at Rushey Green Primary School overwhelmingly enjoy science resulting in motivated learners with sound scientific understanding.

2. Teaching and Learning

Staff and children were involved in the creation of the Rushey Green primary School Science Principles.

These posters are on display on the working wall in classrooms and referred to throughout the coverage of each science topic.



- Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom.
- Teachers ask a range of questions which enable all children to take part, listening carefully to answers and taking learning forward, using open and closed questions and allowing children time to think.
- Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge
- Teachers use precise questioning in class to test conceptual knowledge and skills, and assess pupils regularly to identify those children with gaps in learning, so that all pupils keep up.
- New vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics.

- Working scientifically skills are embedded into lessons to ensure these skills are being developed throughout the children's school career. The key knowledge for each topic and across each year group is mapped across the school and checked at the end of each science topic.
- Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding.
- Teachers find opportunities to develop children's understanding by accessing outdoor learning.

Scientific knowledge and conceptual understanding
While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage.

Spoken language - Children are actively encouraged to talk about their science learning using variety of subject specific language to enable their development and confidence in the use of **scientific vocabulary** and their ability to articulate scientific concepts clearly and precisely**.** Children should read and spell scientific vocabulary at a level consistent with their word reading and spelling knowledge. See **Annexe B** – Progression of vocabulary.

Working scientifically is embedded within lessons and focuses on the key features of scientific enquiry, so that children learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Children are given the opportunity to seek answers to questions and apply their mathematical knowledge through collecting, analysing and presenting data. See **Annexe A** – Progress in Working Scientifically.

3. Assessment
Children's progress is continually monitored through ongoing formative assessment which is used to inform future teaching and learning so that gaps in knowledge and skills can be identified and closed.
At the start of a topic, the children identify what they know already as well as what they would like to know so that teachers can tailor the learning to meet their needs. The children receive effective feedback both orally during the lessons and through written feedback.

Teachers use a variety of strategies to gain evidence of a child's understanding.
These include:

- Observing children at work, individually, in pairs, in a group, and in classes.
- Questioning, use of Concept Cartoons, talking and listening to children
- Considering work/materials / investigations produced by children together with discussion about this with them.

At the end of each science topic, this key knowledge is checked against the key objectives and a summative Teacher Assessment is recorded.

4. Planning and Resources
Coverage of the National Curriculum for Science

- Each year group will cover units of work as shown in our Science Curriculum. (See Science Curriculum)
- Each of these units will be supported by the Kent Scheme of Work for Science (2014), as well as ideas and activities from a range of other sources.

Planning is a process in which all teachers are involved. Planning should be done with parallel teachers. All teachers should keep a copy of the termly and weekly planning in their files.

Further evidence of 'good science' taking place in classrooms includes:

- An active learning environment, showcasing the Rushey Green Primary School's Science Principles, and relevant Working Scientifically posters for the age phase on the working walls during science topic coverage.
- Children being encouraged to ask and answer questions and discuss their work and ideas.
- Children devising and conducting their own investigations within the context of the relevant curriculum content, as well as being given opportunities to develop their 'working scientifically' skills.
- Children recording their findings in a variety of ways.
- Children showing enjoyment in the activities they are undertaking.
- The cross curricular teaching of science.

We have sufficient, high-quality science resources to aid and support the teaching of all units and topics taught, from EYFS to Y6. We keep these under the central stairs or in the PPA room, where they will be labelled and easily accessible to all staff. EYFS have a range of resources kept in classes, enabling simple access for children during exploration. The library contains a good supply of science topic books to support children's individual research.

5. EYFS

The science content in the Foundation Stage is delivered through the 'Understanding of the World' strand of the EYFS curriculum. This involves guiding children to make sense of their physical world and their community through opportunities to explore, observe and find out about people, places, technology and the environment. They are assessed according to the Development Matters attainment targets.

7. Phases

KS1

You will see children:

- Observing phenomena, looking more closely at the natural and humanly-constructed world around them.
- Being curious and asking questions about what they notice.
- Being helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information.
- **Scientific Talk** - using simple **scientific language** to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways.
- Learning through first-hand practical experiences.
- Using appropriate secondary sources, such as books, photographs and videos at times.
- Making links to other subjects e.g. Maths and the world around them.
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LKS2

You will see children:

- Broadening their scientific view of the world around them.
- Exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments.
- Developing their ideas about functions, relationships and interactions.
- Asking their own questions about what they observe and making some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things.
- Carrying out simple comparative and fair tests.

- Finding things out using secondary sources of information.
- Drawing simple conclusions.
- **Scientific talk -** using some **scientific language**, first, to talk about and, later, to write about what they have found out.
- Making links to other subjects e.g. Maths and the world around them.

UKS2

You will see children:

- Developing a deeper understanding of a wide range of scientific ideas.
- Exploring and talking about their ideas;
- Asking their own questions about scientific phenomena;
- Analysing functions, relationships and interactions more systematically.
- Encountering more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates.
- Beginning to recognise that scientific ideas change and develop over time.
- Selecting the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things.
- Carrying out comparative and fair tests.
- Finding things out using a wide range of secondary sources of information.
- Drawing conclusions based on their data and observations
- Using evidence to justify their ideas.
- Making links to other subjects e.g. Maths and the world around them.
- **Scientific talk** - using their **scientific language** and scientific knowledge and understanding to explain their findings. Pupils should read, spell and pronounce scientific vocabulary correctly

Equal opportunities / Special Educational Needs / Gifted and Talented

The school equal opportunities policy clarifies the way in which we at Rushey Green strive to ensure the equal provision for all children regardless of their gender, race, religion, class or ability.

We achieve these goals in Science by:

- Involving all of the children in oral work
- Planning differentiated work to suit the ability of the children
- Allowing access to materials and equipment
- Ensuring that course content is relevant to all children
- Having high expectations of every child
- Presenting children with positive images and role models to challenge existing stereotype views that scientists are synonymous with white male western culture. It will indicate the contribution women have made to scientific/technological achievements and that scientists come from a variety of backgrounds.
- To learn about scientific/technological achievements associated with different cultures historically

Health and Safety

- The safe use of equipment, materials, places and spaces is promoted at all times. The Association for Science Education (ASE) document 'Be Safe' has been adopted by the school as a guide to health and safety in science.
- All offsite activities will require the class teacher to perform a risk assessment.
- CLEAPSS will be contacted by teachers should they have a query concerning health and safety.

Reviewed by Michael Grocock – May 2020

Annexe A – Progression of skills

Strands of Learning	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Working Scientifically Planning	Ask questions based on exploration of the world around them. Respond to prompts by making some suggestions about how to find an answer.	Ask simple questions and recognise that they can be answered in different ways. Use simple secondary sources to find answers. Talk about similarities and differences	Respond to suggestions of how to answer questions about the world around them and ask effective and relevant questions. Recognise when and how secondary sources should be used. Discuss the most appropriate type of scientific enquiry to use to answer questions. Recognise that questions can be answered in different ways	Raise own relevant questions and use different types of scientific enquiry to answer questions. Recognise when and how secondary sources should be used. Make decisions about the most appropriate type of scientific enquiry to answer questions. Recognise and identify the factors needed to make a test 'fair'. Identify the factors in a simple 'fair' test that we will measure (variables) and keep the same (control).	Explore ideas and raise a range of relevant questions. Recognise which secondary sources are most useful and begin to recognise the difference between fact and opinion. Select and plan the most appropriate type of scientific enquiry for answering a scientific question. Decide which variables to measure change and keep the same. Demonstrate how to change one factor (variable) whilst keeping others the same (control). Identify and use an appropriate unit to measure variables effectively	Explore ideas and raise a range of different kinds of relevant questions based on accurate scientific principles. Recognise and use the secondary sources that are most useful separating opinion from fact. Select and plan accurately the most appropriate type of scientific enquiry for answering scientific questions. Decide which variables to measure change and keep the same. Demonstrate how to change one factor (variable) whilst keeping others the same (control). Identify and use an appropriate unit to measure variables effectively	Use simple models to describe scientific ideas. Explain how to construct a complex test. Plan different types of enquiries to answer questions and put measures in place to ensure accuracy and reliability. Select the most suitable variables to be investigated. Identify some variables that cannot be controlled or explain. Recognise some situations in which a fair test cannot be carried out.
Working Scientifically Observation & Recording	Respond to prompts by making some suggestions about how to make an observation. Use senses and simple equipment to make observations. Talk about what happens and record	Carry out instructions for a simple investigation. Talk about and record what is seen and observed Take accurate measurements using simple equipment, e.g. cm and scales with one interval.	Describe what happens when taking part in simple investigations/fair tests. Begin to make decisions about what to observe, how long to observe for? Read simple scales and take accurate measurements using standard units, e.g.	Recognise when to set up simple practical enquires, comparative and fair tests. Make decisions about what to observe, how long to observe for, and the type of equipment needed. Make systematic and	Recognise when and how to set up comparative and fair tests and begin to explain which variables need to be controlled and why. Make decisions about what to observe, what measurements to use and how long to	Recognise when and how to set up comparative and fair tests and clearly explain which variables need to be controlled and why. Make independent and well-founded decisions about what to observe, what measurements to use and how long to measure them for.	Recognise when and how to set up comparative and fair tests and clearly explain which variables need to be controlled and why. Record observations and measurements systematically. Choose the most efficient units of measurement and convert as and when appropriate.

	using words and pictures. Begin to record data in simple templates.	Begin to identify and classify data and information. Record data using simple charts, tables and block graphs.	Thermometers, graduated beakers and data loggers. Talk about criteria for grouping, sorting and classifying, use simple keys. Record data using a range of charts, tables and block graphs/ pictograms and labelled diagrams.	accurate observations and measurements. Use a range of measuring equipment appropriately including thermometers, data loggers etc. Gather, record, classify and present data in a variety of ways to help answer questions. Use and construct increasingly complex tables, bar graphs and keys to record findings	measure them for. Choose appropriate equipment to make measurements, using standard units of measure and simple scales accurately and with precision. Gather, record, classify and present a range of data in different ways. Record data and results using scientific diagrams and labels, classification keys, tables, and bar and line graphs	Choose the most appropriate equipment (with a variety of intervals and units) to make measurements and explain how to use accurately and with precision. Gather, record, classify and present data in a wide range of ways. Use a wide range of methods to record data including line graphs, scientific diagrams, classification keys, scatter, bar and line graphs etc.	Present comparative data in a range of formats including, pie charts, line graphs and scatter grams etc. Label diagrams using appropriate scientific symbols, e.g. circuit diagrams in parallel.
Working Scientifically Conclusions	Begin to use simple features to compare objects, materials and living things. Identify what has changed when observing objects, living things or events. Talk in simple terms about what might happen based own experiences.	Talk about describe and sort simple similarities and differences, noting patterns and relationships. Record and communicate findings in a range of ways using simple scientific language. Talk about what has been found out and how it was discovered. Talk in simple scientific terms about what might happen and why? (prediction)	Begin to look for patterns and decide what data to collect to identify them. Talk about data collected from observations and measurements, using drawings, labelled diagrams, notes, simple tables and keys, standard units and simple equipment including data loggers. Begin to draw and express some conclusions, by looking at changes, patterns, similarities and differences in data. Begin to identify new questions arising from data, make new predictions for new values within or beyond the data collected.	Look for patterns and decide on the range of data needed to identify them. Collect data from observations and measurements, using notes, simple tables and standard units, using drawings, labelled diagrams, keys, bar charts and tables. Identify changes, patterns, similarities and differences in data in order to draw conclusions. Suggest improvements and identify new questions arising from data, make new predictions for new values within or beyond the data collected.	Decide how to record data from a choice of familiar approaches. Use relevant scientific language to communicate findings and justify scientific ideas. Look for different relationships in data and begin to identify evidence that refutes or supports ideas. Make practical suggestions about how working methods could be improved. Use results to identify when further tests and observations might be needed. Make general statements such as:	Decide in detail how to record data accurately from a choice of familiar approaches. Use relevant scientific language and illustrations to discuss, communicate and justify findings and scientific ideas. Look for a range of different relationships in data and begin to identify evidence that refutes or supports ideas. Identify when tests need to be repeated in order to attain reliable results. Use test results to make predictions and set up further comparative and fair tests. Make increasingly measured general statements such as: 'As the temperature increases the mass of the sugar which can be dissolved increases.'	Use quantitative and qualitative data to support conclusions. Use scientific knowledge and understanding to challenge the conclusions of others. Identify a range of scientific evidence that has been used to support or refute ideas or arguments. Identify when tests need to be repeated in order to attain reliable results. Use test results to make predictions, supported by relevant and accurate evidence to set up further comparative and fair tests.

				Report on findings from enquires including oral and written explanations	'the hotter the water, the faster the sugar dissolves'		
National Curriculum Programme of Study	**Subject Content at Key Stage One** Plants – identify and name types of common flowers and trees and life cycles of plants Animals including Humans – classifying and naming animals and exploring habitats and needs. Everyday Materials – identify, name and describe properties. Compare and group materials and explore the their uses Seasonal Change Living things and their Habitats			**Subject Content at Key Stage Two** Plants Animals, including Humans Rocks Light Forces and Magnets Living things and their Habitats States of Matter Sound Electricity Properties and changes of Materials Earth and Space Forces Evolution and Inheritance			

Annexe B – Progression of Scientific Vocabulary

EYFS	KS1	LKS2	UKS2
Places Woodland, Desert, Ocean, Sea, Jungle, Arctic, Log, Seaside, Stone, Tree, Soil	**Animals including Humans** Fish, Reptiles, Mammals, Birds, Amphibians (+ examples of each) Herbivore, Omnivore, Carnivore, Leg, Arm, Elbow, Head, Ear, Nose, Back, Wings, Beak, Survival, Water, Air, Food, Adult, Baby, Offspring, Kitten, Calf, Puppy, Exercise, Hygiene	**Animals including Humans** Movement, Muscles, Bones, Skull, Nutrition, Skeletons, Mouth, Tongue, Teeth, Oesophagus, Stomach, Small Intestine, Large Intestine, Herbivore, Carnivore, Canine, Incisor, Molar	**Animals including Humans** Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Circulatory, Heart, Blood Vessels, Veins, Arteries, Oxygenated, Deoxygenated, Valve, Exercise, Respiration
Objects and materials Fruit, Vegetables, Object, Material, Hard, Soft, Strong	**Plants** Deciduous, Evergreen trees, Flowers (blossom), Petals, Fruit, Roots, Bulb, Seed, Trunk, Branches, Stem, Seeds, Bulbs, Temperature, Growth	**Living Things and their Habitats** Vertebrates, Fish, Amphibians, Reptiles, Birds, Mammals, Invertebrates, Snails, Slugs, Worms, Spiders, Insects, Environment, Habitats	**Living Things and their Habitats** Mammal, Reproduction, Insect, Amphibian, Bird, Offspring, Classification, Vertebrates, Invertebrates, Micro-organisms, Amphibians, Reptiles, Insects
Living things- Plants Grow, Water, Light, Flower, Leaves	**Living Things and their Habitats** Living, Dead, Habitat, Energy, Food chain, Predator, Prey, Woodland, Pond, Lifecycle	**Plants** Air, Light, Water, Nutrients, Soil, Reproduction, Transportation, Dispersal, Pollination, Flower	**Properties and Changes of Materials** Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing
Living things- Animals Body, Adult, Baby, Child, Egg, Birds, Insects, Bugs, Mini-beasts, Fish	**Everyday Materials** Stretchy, Stiff, Shiny, Dull, Rough, Smooth, Bendy, Waterproof, Absorbent, Opaque, Transparent Brick, Paper, Fabrics, Squashing, Bending, Twisting, Stretching Elastic, Foil	**Rocks** Fossils, Soils, Sandstone, Granite, Marble, Pumice, Crystals, Absorbent	**Earth and Space** Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation
Seasons Cold, Warm, Hot, Sun, Rain, Snow	**Seasonal Changes** Summer, Spring, Autumn, Winter, Sun, Day, Moon, Night, Light, Dark	**States of Matter** Solid, Liquid, Gas, Evaporation, Condensation, Particles, Temperature, Freezing, Heating	**Forces** Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys
	Working Scientifically Question, Answer, Observe, Observing, Equipment, Identify, Classify, Sort,	**Light** Light, Shadows, Mirror, Reflective, Dark, Reflection	**Evolution and Inheritance** Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics

EYFS	KS1	LKS2	UKS2
	Group, Record, Diagram, Chart, Map, Data, Compare, Contrast, Describe, Biology, Chemistry, Physics		
		Sound Volume, Vibration, Wave, Pitch, Tone, Speaker	**Light** Refraction, Reflection, Light, Spectrum, Rainbow, Colour
		Forces and Magnets Magnetic, Force, Contact, Attract, Repel, Friction, Poles, Push, Pull	**Electricity** Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators, Amps, Volts, Cell
		Electricity Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators	**Working Scientifically** Plan, Variables, Measurements, Accuracy, Precision, Repeat readings, Scientific diagrams, Labels, Classification Keys, Tables, Scatter graph, Line graph, Predictions, Further comparative and fair test, Conclusions, Casual relationships, Explanations, Degree of trust, Support, Refute ideas, Identify, Classify, Describe, Patterns, Systematic, Quantitative measurements

EYFS	KS1	LKS2	UKS2
		Working Scientifically Research, Relevant, Questions, Scientific Enquiry, Comparative and fair test, Systematic, Careful, Observation, Accurate, Measurements, Classify, Present, Record, Drawings, Labelled diagrams, Keys, Bar Charts, Tables, Oral and Written explanations, Equipment, Thermometer, Data Logger, Data, Gather, Conclusion, Predictions, Differences, Similarities, Changes, Evidence, Improve, Secondary sources, Guides, Construct, Interpret	

Scientific Talk - All the vocabulary above is to be used when teachers talk to children and children talk to children in lessons.

Denotes vocabulary children will be able to define and understand by end of each key stage