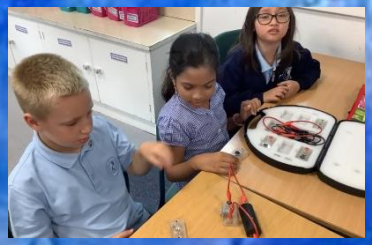



# St Luke's School

# Curriculum Progression Document

# Science

# Contents



# Science Curriculum Intent

Curriculum Intent

**School Curriculum Intent:**

As a values-led school, our curriculum is underpinned by Care, Challenge & Achieve. It is through these values that we develop the whole child. It is our intent that children leave St Luke's ready to move forward in their learning, kind, resilient, filled with a confidence to live well in society and prepared to deal effectively with the challenges that the modern world presents as well equipped digital and global citizens.

**Subject Intent:**

It is our intent that children will have a secure and broad knowledge of the physical, chemical and biological scientific world around them. This will be achieved through exploration, observation, critical thinking and working scientifically. Through allowing equal scientific opportunities for all, children will develop a passion for exploring, unpicking and unlocking the world of science. Children will plan and carry out their own investigations, experiments and fieldwork, solving challenging problems and reporting scientific findings.

Rationale for Decisions About What is Taught and When:

**Essential Characteristics in Science:**

- The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings.
- Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations.
- Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.
- High levels of originality, imagination or innovation in the application of skills.
- The ability to undertake practical work in a variety of contexts, including fieldwork.
- A passion for science and its application in past, present and future technologies.

Curriculum Concepts:

**Work scientifically.**

This concept involves learning the methodologies of the discipline of science.

**Understand plants.**

This concept involves becoming familiar with different types of plants, their structure and reproduction.

**Understand animals and humans.**

This concept involves becoming familiar with different types of animals, humans and the life processes they share.

**Investigate living things.**

This concept involves becoming familiar with a wider range of living things, including insects, and understanding life processes.

**Understand evolution and inheritance.**

This concept involves understanding that organisms come into existence, adapt, change, and evolve and become extinct.

**Investigate materials.**

This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.

**Understand movement, forces, and magnets.**

This concept involves understanding what causes motion.

**Understand the Earth's movement in space.**

This concept involves understanding what causes seasonal changes, day and night.

**Investigate light and seeing.**

This concept involves understanding how light and reflection affect sight.

**Investigate sound and hearing.**

This concept involves understanding how sound is produced, how it travels and how they are heard.

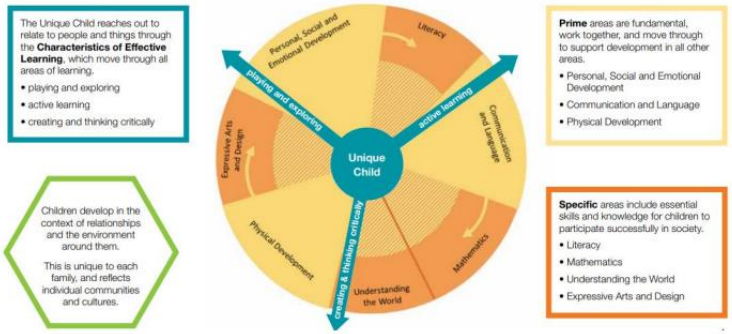
**Understand electrical circuits.**

This concept involves understanding circuits and their role in electrical applications.


# Science in the Early Years Foundation Stage

## Developing early scientific skills

## Developing Early Subject Skills – EYFS info



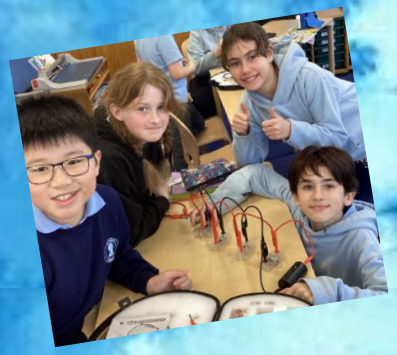

Each area of the EYFS curriculum has an Early Learning Goal, which is the standard that a child is expected to achieve by the end of their reception year. The ELG (Early Learning Goals) covers all of the 7 areas of learning as specified in the Early Years Foundation Stage Curriculum.

The following link to the teaching and learning of Science in our EYFS:

## ELG 15: Understanding the World: The Natural World

Children at the expected level of development will:

- Explore the natural world around them, making observations and drawing pictures of animals and plants;
- 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;
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.




# Science and the Jersey Curriculum

Science Specific Implementation/development of a programme of study

## Science and the National Curriculum: Key Stage One

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be 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. They should begin to use 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. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' is described separately in the programme of study but must always be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

**Pupils should be taught about:**

- Working scientifically by asking simple questions and recognising that they can be answered in different ways, observing closely, using simple equipment, performing simple tests, identifying and classifying, using their observations and ideas to suggest answers to questions, gathering and recording data to help in answering questions.

| | Autumn | Spring | Summer |
|---|---|---|---|
| Year 1 | **Physics**<br>• observe changes across the four seasons.<br>• observe and describe weather associated with the seasons and how day length varies.<br>**Biology**<br>• describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).<br>• identify, name, draw and label the basic parts of the human body and say which | **Chemistry**<br>• describe the simple physical properties of a variety of everyday materials.<br>• compare and group together a variety of everyday materials on the basis of their simple physical properties.<br>• distinguish between an object and the material from which it is made.<br>• identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. | **Biology**<br>• identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.<br>• identify and name a variety of common animals that are carnivores, herbivores and omnivores. |

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| | part of the body is associated with each sense. | | |
| Year 2 | **Chemistry**<br>• find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.<br>• identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. | **Biology**<br>• explore and compare the differences between things that are living, dead, and things that have never been alive.<br>• notice that animals, including humans, have offspring which grow into adults.<br>• 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.<br>• find out about and describe the basic needs of animals, including humans, for survival (water, food and air).<br>• describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. | **Biology**<br>• Observe and describe how seeds and bulbs grow into mature plants.<br>• find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.<br>• 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.<br>• identify and name a variety of plants and animals in their habitats, including micro-habitats. |

## Science and the National Curriculum: Lower Key Stage Two

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make 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 and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

'Working scientifically' is described separately at the beginning of the programme of study but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

**Pupils should be taught about:**

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- Asking relevant questions and using different types of scientific enquiries to answer them.
- Setting up simple practical enquiries, comparative and fair tests.
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
- Identifying differences, similarities or changes related to simple scientific ideas and processes.
- Using straightforward scientific evidence to answer questions or to support their findings.

| | Autumn | Spring | Summer |
|---|---|---|---|
| Year 3 | **Biology**<br>• 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.<br>• Identify that humans and some other animals have skeletons and muscles for support, protection and movement.<br>**Physics**<br>• Compare how things move on different surfaces.<br>• Notice that some forces need contact between two objects, but magnetic forces can act at a distance. | **Physics**<br>• Recognise that they need light in order to see things and that dark is the absence of light.<br>• Notice that light is reflected from surfaces.<br>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.<br>• Recognise that shadows are formed when the light from a light source is blocked by a solid object.<br>• Find patterns in the way that the size of shadows change.<br>**Chemistry** | **Biology**<br>• 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.<br>• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.<br>• Investigate the way in which water is transported within plants.<br>• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. |

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| | • Observe how magnets attract or repel each other and attract some materials and not others.<br>• 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.<br>• Describe magnets as having two poles.<br>• Predict whether two magnets will attract or repel each other, depending on which poles are facing. | • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.<br>• Describe in simple terms how fossils are formed when things that have lived are trapped within rock.<br>• Recognise that soils are made from rocks. | |
| Year 4 | **Physics**<br>• Identify common appliances that run on electricity.<br>• Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.<br>• 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<br>• a battery.<br>• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. | **Biology**<br>• Describe the simple functions of the basic parts of the digestive system in humans.<br>• Identify the different types of teeth in humans and their simple functions.<br>• Recognise that living things can be grouped in a variety of ways.<br>• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. | **Physics**<br>• Identify how sounds are made, associating some of them with something vibrating.<br>• Recognise that vibrations from sounds travel through a medium to the ear.<br>• Find patterns between the pitch of a sound and features of the object that produced it.<br>• Find patterns between the volume of a sound and the strength of the vibrations that produced it.<br>• Recognise that sounds get fainter as the distance from the sound source increases.<br>**Chemistry**<br>• Compare and group materials together, according to whether they are solids, liquids or gases. |

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| | • Recognise some common conductors and insulators, and associate metals with being good conductors.<br>**Biology**<br>• Recognise that environments can change and that this can sometimes pose dangers to living things.<br>• Construct and interpret a variety of food chains, identifying producers, predators and prey. | | • 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)<br>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. |

## Science and the National Curriculum: Upper Key Stage Two

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select 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 and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

'Working and thinking scientifically' is described separately at the beginning of the programme of study but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read, spell and pronounce scientific vocabulary correctly.

**Pupils should be taught about:**

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Using test results to make predictions to set up further comparative and fair tests.
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- Identifying scientific evidence that has been used to support or refute ideas or arguments.

| | Autumn | Spring | Summer |
|---|---|---|---|
| Year 5 | **Biology**<br>• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.<br>• Describe the life process of reproduction in some plants and animals.<br>• Describe the changes as humans develop to old age.<br>**Chemistry**<br>• Demonstrate that dissolving, mixing and changes of state are reversible changes.<br>• Explain that some changes result in the formation of<br>• new materials, and that this kind of change is not usually reversible, including changes associated with<br>• burning and the action of acid on bicarbonate of soda.<br>• Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.<br>• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. | **Chemistry**<br>• 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.<br>• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.<br>**Physics**<br>• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.<br>• Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.<br>• Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. | **Physics**<br>• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.<br>• Describe the movement of the Moon relative to the Earth.<br>• Describe the Sun, Earth and Moon as approximately spherical bodies.<br>• Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. |

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| Year 6 | **Physics**<br>• Recognise that light appears to travel in straight lines.<br>• 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.<br>• 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.<br>• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.<br>**Biology**<br>• Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.<br>• Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.<br>• Describe the ways in which nutrients and water are transported within animals, including humans. | **Biology**<br>• 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.<br>• Give reasons for classifying plants and animals based on specific characteristics.<br>**Physics**<br>• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.<br>• 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.<br>• Use recognised symbols when representing a simple circuit in a diagram. | **Biology**<br>• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.<br>• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.<br>• Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. |


# Whole School Science

# Programme of Study

| Curriculum Map – themes / topics | | | | | | |
|---|---|---|---|---|---|---|
| | Autumn | | Spring | | Summer | |
| Year 1 | Changing Seasons | Parts of Animals | Identifying Materials | Comparing Materials | Types of Animals | Plants |
| Year 2 | Changing Shape | Uses of Materials | Living Things | Feeding and Exercise | Growing Plants | Habitats |
| Year 3 | Movement and Feeding | Magnets and Forces | Light and Shadows | Rocks and Soils | What Plants Need | Parts of Plants |
| Year 4 | Electricity | Dangers to Living Things | Human Nutrition | Grouping Living Things | Sound | Changes of State |
| Year 5 | Life Cycles | Types of Change & Separating Mixtures | Materials | Forces | Earth and Space | Animals including humans |
| Year 6 | Light and Sight | Our Bodies | Classifying Living Things | Changing Circuits | Evolution and Inheritance | Review and Celebration |

# Implementation

Approaches to Teaching and Learning in Science.

Teaching and learning will focus on a range of agreed entitled experiences and there will be a focus on:

- Developing a clear progression of knowledge and skills linked to the essential learning objectives of the subject.
- Ensuring that appropriate opportunities are taken to develop cross-curricular skills such as English, Mathematics and Computing skills.
- The explicit teaching of how to work scientifically in each year group by carrying out a range of investigations and experiments.
- The consistent use of a range of teaching and learning approaches to engage pupils in the study of science. This will include objective and question led learning, observation and recording, class and group discussion, role play, handling a range of different materials, teaching of specific knowledge and retrieval practise activities.
- The study of important people, both male and female, who have influenced our understanding of science throughout history and in the modern world.
- The study of important scientific discoveries
- To use scientific knowledge to support, evaluate and challenge their own and others' views using detailed, appropriate and accurate scientific evidence derived from a range of sources. These are particularly relevant when understanding how the actions of others and their own actions impact on the world around them.
- The use of enrichment opportunities such as trips, visits and visitors.

Teaching, Recording, Feedback, Assessment and Reporting

**This will happen by:**

- Learning Intentions are shared with children each lesson and displayed in children's books.
- Children are given a context through which they can explore each learning intention.
- The key knowledge for each unit is shared with children and parents through a knowledge organiser, which may include diagrams, key vocabulary, essential facts and key people associated with the learning. It will also highlight the key learning that will have taken place prior to this and pose questions which will form the basis of the learning enquiry.
- Teaching is focused on input, experiences and activities which promote the development of scientific understanding in the given area of learning at that time.
- The various methods of recording should demonstrate the children's understanding of the lesson's learning intention and how deeply they have understood the intention.
- Teachers' feedback should directly relate to the learning intention for the lesson, give specific ways in which the child has been successful.
- Gap Task and any verbal feedback where necessary.
- Children are given the opportunity to assess their own and others' progress. This may be recorded in books or done verbally.
- All Gap Tasks should be meaningful and purposeful and linked to small next steps for progress in science understanding and knowledge. They should be scaffolded where necessary.
- Teachers should use observations and work recorded by children to make judgements of the children's current progress against their year group's expectations.
- Teachers' judgements will also be informed by lessons outcomes and quizzes based on questions within the knowledge organisers.
- Regular retrieval practice focuses on children knowing and remembering more of what they have been taught previously.

- Assessment information will be used to plan future work for the class, including any intervention necessary.
- This continual assessment will be used to report to parents. End of year academic reports will contain comments about an individual pupil's progress against the year group expectations.
- All formative and summative assessments made will be used to inform discussions around pupils' progress and attainment in the subject at appropriate times, for example discussions with other professionals and reporting to parents on during parent consultation evening etc.
- Key scientist have been considered and chosen specifically for each area of focus and year group. Children will be introduced to these and links made to them in their learning. These scientists have been systematically planned over the year groups to allow progression in knowledge and understanding of the world around them.
- Children are exposed to, and will build, a range of age and topic related vocabulary from EYFS to year 6. This is found in the POS and builds on prior knowledge.
- Children are assessed at the end of each topic area. This is done through quizzes and assessment of understanding in lessons which is then collated by the class teacher and recorded on an assessment document. This can then be monitored by the science leader. Teachers can use this information for future planning opportunities / retrieval task / GT etc.

Reading in Science.

Reading is not only a crucial way for children to learn science content, it is also an important part of what professional scientists actually do.
Many children have difficulty in science because they tend to be passive readers, readers who receive information without understanding. Passive reading is a style of reading that a child might use when reading for pleasure. However, to successfully read science text, they must be an "Active reader". Active readers interact with text to construct meaning. They make predictions, ask questions, generate questions, and vigorously seek answers. For active readers, reading is a means of actively pursuing knowledge. Active readers engage in metacognition, which is an awareness of how they think. Active readers use both pre-reading and during-reading strategies to enhance their comprehension.

SMSC & Rights Respecting in Science.

## Spiritual development

Spiritual education in Science involves the search for meaning and purpose in natural and physical phenomena. It is the wonder about what is special about life, an awe at the scale of living things from the smallest microorganism to the largest tree and the interdependence of all living things and materials of the Earth. It concerns the emotional drive to know more and to wonder about the world and aesthetically appreciate its wonders including for example the enormity of space and the beauty of natural objects or phenomenon, plants, animals, crystals, rainbows, the Earth from space etc.

## Moral development

Science supports moral development by showing children that different opinions need to be respected and valued. There are many moral and ethical issues that we cover in science including discussions about environmental and human issues. Science at St Mary's encourages children to consider and respect their environment as well as become naturally curious beings.

## Social development

Science supports social development by exposing children to the power of collaborative working in the science community which has led to some amazing and life changing breakthroughs in medicine. When undertaking experiments and research children work collaboratively.

## Cultural development

Science supports cultural development by looking at how scientists from a range of cultures have had a significant impact globally. It also helps children to understand how important science is to the economy and culture of the UK.

## Oracy - Progression of skills:

### Tiered Vocabulary Wall.

### A way to organise our words.

Tiered Vocabulary Walls are a way of organising words. The aim of using Tiered Vocabulary Walls is to increase the amount of Tier 2 and Tier 3 words which children hear and use themselves. Tier 2 and Tier 3 words make the most impact on our vocabulary and on our learning. These words need direct teaching in order for them to be understood and used.

**Tier 1 - Everyday words:** These will be basic, everyday words which will be used from an early age. These will be used freely in speech, such as:

*warm, dog, tired, run, table, flower...*

**Tier 2 - Focus words:** These will be common words that are found across subjects. These will need direct teaching, such as:

*contradict, circumstance, precede, retrospect...*

**Tier 3 - Subject specific words:** These will be rare and will be heard within particular contexts or subject areas. These will need direct teaching, such as:

*estuary, alliteration, igneous...*

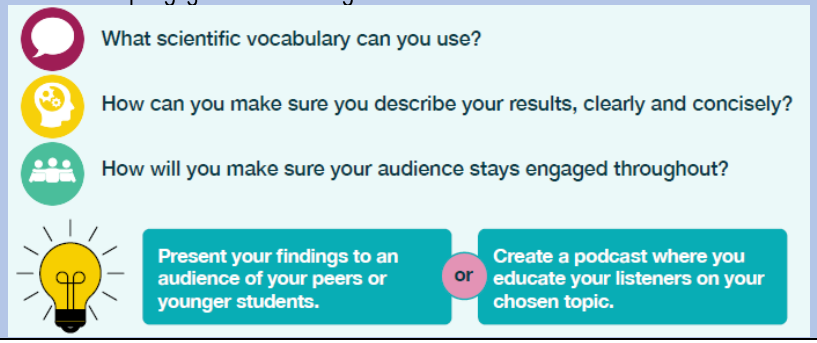
### Speaking like a Scientist.

**Speak concisely** (keep it short!) so that you explain complex ideas in a way that is easy for others to understand.

**Structure** your ideas clearly, making sure that you have fully explained your scientific enquiry.

**Use expert scientific vocabulary**, but make sure that your audience understands it too.

Ask probing and clarifying **questions** to challenge others and developing your reasoning.



| Speaking like a Scientist sentence stems: |
| --- |
| • It is...because...<br>• It will...because...<br>• How do you know (e.g. 'The porridge is hot')? |
| • I think this...because...<br>• I know this, so I think...<br>• This will happen because...<br>• What do you think?<br>• What will happen if...? |
| • I know that.... Therefore, I know that...<br>• Due to the fact that..., I know that...will happen.<br>• Maybe it's because...<br>• It is true that...<br>• Having analysed..., I believe that...<br>• I can prove how I know this because... |
| • Can we prove that...?<br>• In conclusion, I have found that...<br>• I would like to prove / disprove...<br>• Perhaps the reason is ...<br>• Based on the evidence I have been presented with, I conclude...<br>• Taking everything into account...<br>• Having pondered...<br>• Given this, it is likely that...<br>• If we accept this hypothesis, what else will be true? |