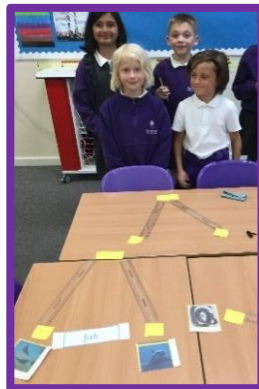


Our Science Curriculum



Our Aim

Our aim in Science is to give children practical experiences of scientific processes by allowing them to experiment and find solutions to questions about the world in which they live. We encourage children to understand the relevance of Science to their present lives and how discoveries made today may have implications on their futures.

Children develop scientific knowledge and conceptual understanding of the natural world, materials and physical processes.

We want children to experience the wonder of the scientific world and be excited by what they discover for themselves.

We currently hold the Primary Science Quality Mark.

We currently hold a Royal Horticultural Gardening Award.

Children from Year 1 to 6 will follow the expectations of the National Curriculum. Our KS1 and KS2 Science curriculum covers all the areas.

In the Early Years Foundation Stage (EYFS), children in Nursery and Reception will follow the expectations of the EYFS Framework. The level of development children should be expected to have attained by the end of the EYFS is defined by early learning goals (ELGs).

Science learning is covered within the Specific area of Understanding of the World. Understanding the World is split into 3 areas: Past and Present, People, Culture and Communities and The Natural World. Our EYFS Science curriculum covers The Natural World.

Our Science Curriculum Construction

Our Science curriculum is grounded in the programmes of study of the National Curriculum for England. The title of each block of knowledge and concepts has been kept to the headings of the National Curriculum so that children are clear which strand [Chemistry, Physics or Biology] they are learning about. This sequence of knowledge and concepts is arranged as progressive blocks of key ideas in biology, chemistry and physics, alongside a progression in the skills of working scientifically. The conceptual ideas in Biology, Chemistry and Physics build on each other and children need to develop a strong understanding of each set of ideas in order for the next set to make sense and for them to make progress. The Programme of Study is set out year by year for Key stages 1 and 2 but each science topic is not covered in every year. It is therefore important that teachers and children know where each block of ideas fits into the overall sequence.

We have enhanced our curriculum provision by including [alternatively] a unit of 'Scientific Investigation' and the next year a unit on 'Scientists who changed the World'. The 'Scientific Investigation' block is particularly useful to develop one or more of the units covered over the year, to answer any of the questions that the children have postulated over the year or to choose investigations that will promulgate awe and wonder in the children. Revisiting aspects of units previously covered will also aid in memory retention and recall.

The unit of 'Scientists that changed the world' will give the children time to research on scientists that have been pre-eminent in their units of work over the year or to cover areas that the children have been interested in. This will also enhance the memory and recall of the pupils.

Year 6 has a longer unit for Evolution and Inheritance to allow the students to familiarise themselves with scientists such as Charles Darwin, Alfred Russel Wallace, Mary Anning and the theories of Jean-Baptiste Lamarck. It will also allow for a depth of study which is appropriate for our older children and will assist in making them secondary-ready. This year group

does not, therefore, have the special unit at the end of the year as it is incorporated into the spring unit.

We further enrich the curriculum [and promote the importance of science] by holding a Science Day each year which is devoted to wow-inducing experiments [that don't fit in with the curriculum provision] and the science behind them, and by bringing in duck and chicken eggs, hosting visiting zoos, inviting visitors to the school and going on science-based trips etc.

One of our most valuable resources is the Courtyard and the pond. Frogs hopping into the school most definitely cause awe and wonder!

Because the programmes of study are spiralised we have ensured that the strands that are revisited are planned to expand the knowledge and skills acquisition of the children coupled with the increasing ability to apply the skills and knowledge in wider applications. To be certain that the children will make maximum progress teachers will establish that the children have a secure understanding of the key concepts in each block.

The Progress in Knowledge matrix details the knowledge coverage for each year. This is particularly important for the spiral nature of the science curriculum so that teachers can check the prior learning and the future learning. This matrix shows clearly where topics are re-visited and also delineates the links between topics.

Similarly, the Working Scientifically Skills matrix clearly lays out the build-up of skill development.

As part of our Science curriculum, each classroom has a full set of Science Super Hero Squad posters on display. Each Science Super Hero character represents one of the lines of enquiry of the 'Working Scientifically' section of the National Curriculum, which helps the children to become more familiar with each line of enquiry.

Over the years Parkside has trialled a number of published schemes of work and identified a myriad of weaknesses in each one therefore we have cannibalised the best ideas from each and compiled them to make a varied and well-resourced curriculum structure.

To encourage the children to think more deeply we use challenge questions appropriate to each phase.

To support critical and original thinking we use:

- Convince Me Cards
- Concept Cartoons
- The Explorify web site
- A bank of challenge questions

To aid memory retention and retrieval we use KWL grids which activate prior knowledge, ask the children to summarise their learning and to revisit it. We also use Knowledge Organisers which help children to encode and store the knowledge in their memories in an orderly and methodical manner.

We fully support the following quote from the National Curriculum,

‘... pupils should be encouraged to recognise
the power of rational explanation and
develop a sense of excitement and curiosity
about natural phenomena.’

Optional homework ideas are offered to the parents / carers every term to link to our science scheme of work.

Science Curriculum Overview

YEAR GROUP	AUTUMN TERM		SPRING TERM		SUMMER TERM	
Nursery		Enchanting Elmer!		Famous Fairy tales!		Reliable Rainbow Fish
		Exploring animal features		Plants and vegetables		Animals and their homes
Reception	All About Me!	Festivals and Celebrations	People Who Help Us	Minibeasts and Growing	We are Explorers!	By the Sea
	Human growth (basics)	Light and dark/ Processes	Contrasting environments	Simple plant features/ Making observations of animals	Similarities and Differences	Investigating States of Matter (changes)
1	Animals, including humans Humans	Animals, including humans Animals	Everyday Materials Names and Properties	Seasonal Changes	Plants Naming and Basic Structure	Scientific Investigation
2	Living things and their habitats Living and Dead	Living things and their habitats Food Chains	Animals, including humans Basics and Babies	Plants Seeds and Bulbs and Basics	Everyday Materials Suitability and Shape Change	Scientists that changed the world
3	Animals, including humans Skeletons and Muscles	Rocks	Light Introduction	Forces and Magnets	Plants Functions and Needs	Scientific Investigation
4	Living things and their habitats Simple Classification	States of Matter Solids, Liquid and Gas	Electricity Introduction	Sound	Animals, including humans Digestive System and Teeth	Scientists that changed the world
5	Earth and Space	Forces Gravity, Resistance and Friction	Animals, including humans Human Time Line [development]	Living things and their habitats Life Cycles and Reproduction	Properties and Changes of Material Grouping and changing	Scientific Investigation
6	Living things and their habitats Classification Advanced	Animals, including humans Circulatory System	Evolution and Inheritance	Evolution and Inheritance	Light Advanced	Electricity Advanced

Progression in Knowledge- Nursery to Year 6

Statements **highlighted** are from other linked topic areas from across the school.

Plants

EYFS	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	- 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.
Year 2	- Observe and describe how seeds and bulbs grow into mature plants. - Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. - Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)
Year 3	- 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.
Year 4	- Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats) - Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats)

	Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
Year 5	Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)
Year 6	- 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. (Y6 - Living things and their habitats) - Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)

Living Things and their Habitats

EYFS	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	- Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) - Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants) - Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans) - Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals including humans) - Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans) - Observe changes across the four seasons. (Y1 - Seasonal change)

Year 2	• Explore and compare the differences between things that are living, dead, and things that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including microhabitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. • Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals including humans)
Year 3	• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)
Year 4	• 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. • Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)
Year 5	• 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.
Year 6	• Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. • Give reasons for classifying plants and animals based on specific characteristics.

Animals- Including Humans

EYFS	• Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	• 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.
Year 2	• Notice that animals, including humans, have offspring which grow into adults. • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.
Year 3	• Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Year 4	• Describe the simple functions of the basic parts of the digestive system in humans. • Identify the different types of teeth in humans and their simple functions. • Construct and interpret a variety of food chains, identifying producers, predators and prey.

Year 5	- Describe the changes as humans develop to old age. - Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) - Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)
Year 6	- 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 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. (Y6 - Living things and their habitats) - Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)

Evaluation and Inheritance

EYFS	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	
Year 2	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. (Y2 - Living things and their habitats)

Year 3	Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)
Year 4	Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
Year 5	
Year 6	- 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.

Seasonal Changes

EYFS	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	- Observe changes across the four seasons. - Observe and describe weather associated with the seasons and how day length varies.
Year 2	
Year 3	Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)
Year 4	
Year 5	Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 - Earth and space)
Year 6	

Materials

EYFS	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	- 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.
Year 2	- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. - Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
Year 3	- Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks) - Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) - Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)
Year 4	- Compare and group materials together, according to whether they are solids, liquids or gases. - Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). - Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Year 5	• 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. • 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.
Year 6	

Rocks

EYFS	• Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)
Year 2	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)
Year 3	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.

	- Describe in simple terms how fossils are formed when things that have lived are trapped within rock. - Recognise that soils are made from rocks and organic matter.
Year 4	
Year 5	
Year 6	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance)

Light

EYFS	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)
Year 2	
Year 3	- Recognise that they need light in order to see things and that dark is the absence of light. - Notice that light is reflected from surfaces. - Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. - Recognise that shadows are formed when the light from a light source is blocked by an opaque object. - Find patterns in the way that the size of shadows change.
Year 4	
Year 5	
Year 6	- 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.

Forces

EYFS	• Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	
Year 2	• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)
Year 3	• Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing.
Year 4	
Year 5	• 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.
Year 6	

Sound

EYFS	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)
Year 2	
Year 3	
Year 4	- Identify how sounds are made, associating some of them with something vibrating. - Recognise that vibrations from sounds travel through a medium to the ear. - Find patterns between the pitch of a sound and features of the object that produced it. - Find patterns between the volume of a sound and the strength of the vibrations that produced it. - Recognise that sounds get fainter as the distance from the sound source increases.
Year 5	
Year 6	

Electricity

EYFS	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	
Year 2	
Year 3	

Year 4	• 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.
Year 5	
Year 6	• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram.

Earth and Space

EYFS	• Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes
Year 1	• Observe changes across the four seasons. (Y1 - Seasonal changes) • Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes)
Year 2	
Year 3	
Year 4	
Year 5	• 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.
Year 6	

Overview of Skills- Working Scientifically- EYFS

Understanding the World- The Natural World

Asking simple questions and recognising that they can be answered in different ways

- Ask questions to find out more
- Ask simple 'why' questions
- Talk about what they see using a wide bank of vocabulary

Observing closely, using simple equipment

- Talk about what they see using a wide bank of vocabulary
- Use new vocabulary

Performing simple tests

- Develop their fine and gross motor skills so that they can use a range of tools competently, safely and confidently

Gathering and recording data to help in answering questions

- Make simple comparisons between objects relating to size, length, weight and capacity

Using their observations and ideas to suggest answers to questions

- Articulate their ideas and thoughts in well – formed spoken sentences

Overview of Skills- Working Scientifically- KS1

Asking simple questions and recognising that they can be answered in different ways

- While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions.
- The children answer questions developed with the teacher often through a scenario.
- The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.

Observing closely, using simple equipment

- Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations.
- They begin to take measurements, initially by comparisons, then using non-standard units.

Performing simple tests

- The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time.

Identifying and classifying

- Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting.
- They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.

Gathering and recording data to help in answering questions

- The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing.
- They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs.
- They classify using simple prepared tables and sorting rings.

Using their observations and ideas to suggest answers to questions

- Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources.
- The children recognise 'biggest and smallest', 'best and worst' etc. from their data.

Overview of Skills- Working Scientifically- Year 3 and 4

Asking relevant questions and using different types of scientific enquiries to answer them

- The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions.
- The children answer questions posed by the teacher.
- Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.

Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers

- The children make systematic and careful observations.
- They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.

Setting up simple practical enquiries, comparative and fair tests

- The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher.
- They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking.

Explanatory note

A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome.

A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.

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

- The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams.
- Children are supported to present the same data in different ways in order to help with answering the question.

Using straightforward scientific evidence to answer questions or to support their findings

- Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence.

Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

- They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.

Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

- They draw conclusions based on their evidence and current subject knowledge.
- They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.
- Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.
- Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.

Identifying differences, similarities or changes related to simple scientific ideas and processes

- Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships.

Overview of Skills- Working Scientifically- Year 5 and 6

Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

- Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry.
- Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.
- The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.

Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate

- The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale.
- During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).

Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

- The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys.
- Children present the same data in different ways in order to help with answering the question.

Identifying scientific evidence that has been used to support or refute ideas or arguments

- Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer.
- They talk about how their scientific ideas change due to new evidence that they have gathered.
- They talk about how new discoveries change scientific understanding.

Using test results to make predictions to set up further comparative and fair tests

- Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using 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

- In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.
- They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used.
- They identify any limitations that reduce the trust they have in their data.
- They communicate their findings to an audience using relevant scientific language and illustrations.

Progression of Relevant Scientific Vocabulary (Linked to Understanding the World- EYFS)

	Nursery	Reception
The Natural World: Plants	tree, leaf, flower	grow, petals, trunk, fruit, branch, roots, leaves, seed, stem
The Natural World: Animals including Humans	head, eyes, nose, mouth, ears, hands, fingers, feet, toes, arm, leg, animal, eat, food	body, person, people, human, walk, talk, move
The Natural World: Environments	water, sand, soil, grass,	ground, floor, field, meadow, forest, stream, river, (pavement), (road)
Materials	wood, glass, paper, water	material, metal, plastic, hard, soft, shape, cook, ingredients
Seasonal Changes	night, day, change	Summer, Spring, Autumn, Winter, dark, light , season, Moon, Sun
Forces, Earth and Space	Sun, moon, stars	Earth, planet, space, weather
Sound, Light and Electricity	loud, quiet, noise	sound, silence, volume, light, dark

Progression of Relevant Scientific Vocabulary- KS1 and KS2

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals, including humans Elbow, ankle, wrist, shoulder, chest, movement, skeleton, muscle, senses, think, sight	Living things and their habitats Living, Dead, Habitat, Energy	Animals, including humans Movement, Muscles, Bones, Skull, Nutrition, Skeletons,	Living things and their habitats Vertebrates, Fish, Amphibians, Reptiles, Birds, Mammals, Invertebrates, Snails, Slugs, Worms, Spiders, Insects, Environment, Habitats	Earth in Space Axis, Rotation, Day, Night, Phases of the Moon, star, constellation	Living things and their habitats Classification, Vertebrates, Invertebrates, Micro-organisms, Amphibians, Reptiles, Mammals, Insects
Animals, including humans Fish, Reptiles, Mammals, Birds, Amphibians (+ examples of each) Herbivore, Omnivore, Carnivore, Beak	Living things and their habitats Food chain, Predator, Prey, Woodland, Pond, Desert	Rocks Fossils, Soils, Sandstone, Granite, Marble, Pumice, Crystals, Absorbent	States of Matter Solid, Liquid, Gas, Evaporation, Condensation, Particles, Temperature, Freezing, Heating	Forces Air resistance, Water resistance, Pulleys Friction, gravity, Newton	Animals, including humans Circulatory, Heart, Blood Vessels, Veins, Arteries, Oxygenated, Deoxygenated, Valve, Exercise, Respiration
Everyday Materials Wood, Plastic, Glass, Paper, Rock, , Bendy, Rough, Smooth	Animals, including humans Survival, Water, Air, Food, Adult, Baby, Offspring, Kitten, Calf, Puppy, Exercise, Hygiene	Light Light, Shadows, Mirror, Reflective, Dark, Reflection	Electricity Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators	Animals, including human Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty	Evolution and Inheritance Fossils, Adaptation [adaption], Evolution, Characteristics, Reproduction, Genetics, Inherit
Seasonal Changes Summer, Spring, Autumn, Winter, Sun, Day, Moon, Night, Light, Dark	Plants Seeds, Bulbs, Water, Light, Temperature, Growth	Forces and Magnets Magnetic, Force, Contact, Attract, Repel, Friction, Poles, Push, Pull	Sound Volume, Vibration, Wave, Pitch, Tone, Speaker	Living things and their habitats Mammal, Reproduction, Insect, Amphibian, Bird, Offspring	Evolution and Inheritance Variation, Conditions, Advantageous, disadvantageous, Characteristics

Plants Deciduous, Evergreen trees, Leaves, Flowers (blossom), Petals, Roots, Bulb, Trunk, Branches, Stem	Everyday Materials Stretchy, Stiff, Shiny, Dull, Rough, Smooth, Bendy, Waterproof, Absorbent, Opaque, Transparent, Brick, Paper, Fabrics, Squashing, Bending, Twisting, Stretching, Elastic, Foil	Plants Air, Light, Water, Nutrients, Soil, Reproduction, Transportation, Dispersal, Pollination, Flower	Animals, including humans Mouth, Tongue, Teeth, Oesophagus, Stomach, Small Intestine, Large Intestine, Herbivore, Carnivore, Canine, Incisor, Molar	Properties and Changes of Material Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing	Light Refraction, Reflection, Light, Spectrum, Rainbow, Colour,
Scientific Investigation Explore, Observe, Compare, Measure, Equipment, Record, Question, Answer, Sort, Diagram, Describe, Examine, Scientist	Scientists that changed the world Enquiry, Experiment, Observing, Identify, Classify, Chart, Map, Data, Contrast, Biology, Chemistry, Physics, Group, Record, Construct, Design, Method, Search, Effect	Scientific Investigation Research, Relevant, Scientific enquiry, Comparative and fair test, Systematic, Careful observation, Accurate measurements, Thermometer, Data logger, Data gather, Explanations, Inquiry, Process, Evidence, Variables	Scientists that changed the world Labelled diagrams, Keys, Bar charts, Tables, Explanations, Conclusion, Predictions, Differences, Similarities, Evidence, Secondary sources, Guides, Keys, Construct, Interpret, Assessment, Analysis	Scientific Investigation Evaluate Variables, Accuracy, Precision, Repeat readings, Record data, Scientific diagrams, Scatter graphs, Bar graph and line graphs, Predictions, Report and present conclusions, , Classify and describe, Patterns, Systematic, Thesis, Procedure	Electricity Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators, Amps, Volts, Cell Classification keys Further comparative and fair test, Causal relationships, Evidentiary support, Refute ideas or arguments, Quantitative measurements, Methodology

Spiritual, Moral, Social and Cultural Development in Science and Understanding the World

Spiritual development

Science is using evidence to make sense of the world. It has the ability to make us feel both enormously insignificant (compared to the scale of the visible universe) and enormously significant (we are genetically unique). It helps us understand our relationship with the world around us (how the physical world behaves, the interdependence of all living things). Making new discoveries increases our sense of awe and wonder at the complexities and elegance of the natural world. For scientists, this is a spiritual experience and drives us onwards in our search for understanding.

Moral development

Whether it's the ethics behind certain medical treatments, the environmental impact of industry, or how government funding is allocated to scientific projects; moral decisions are an important aspect of Science. Scientific discoveries and inventions need to be used responsibly, and decisions made based on evidence (not prejudice). As teachers, we encourage pupils to be both open minded (generating a hypothesis) and critical (demanding evidence) and to use their understanding of the world around them in a positive manner.

Social development

Scientists are collaborators. Sharing ideas, data, and results (for further testing and development by others) is a key principle of the scientific method. We encourage pupils to work together on scientific investigations and to share results (to improve reliability). Science has a major impact on the quality of our lives. In Science lessons, pupils consider the social impact (both positive and negative) of science and technology.

Cultural development

Science permeates modern culture, and has played a key part in developing it. It is (both currently and historically) an international activity. In Science lessons, we explore and celebrate research and developments that take place in many different cultures, both past and present. We explore how scientific discoveries have shaped the, beliefs, cultures and politics of the modern world.

Specific examples of Spiritual, Moral Social and Cultural Develop in Science include:

- Studying and discussing the impact on human beings on the environment, the problems created by industry and possible solutions.
- Investigating the impact of significant scientists from around the world.
- Debating and discussing ethical issues in science such as cloning, genetic modification, nuclear power, climate change.
- Studying the scientific method and how scientists collaborate to share and test ideas.

Essential Characteristics Endpoint of a Learner in Understanding the World- The Natural World EYFS

By the end of Reception every child will be able to:

- Talk about the properties of materials.
- Make a sensible simple prediction.
- Record simple findings.
- Observe, notice and make verbal comparisons (similarities and differences).
- Talk about the characteristics of weather and seasons.
- Name the simple parts of plants and animals.
- Make conclusions verbally.
- Talk simply about changes in our world.

Essential Characteristics Endpoint of a Learner in Science

The intent of the Science curriculum at Parkside Primary School is to provide every pupil with:

- 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.