THE WILLOWS PRIMARY SCHOOL

SCIENCE POLICY

Safeguarding Statement
The school is committed to safeguarding children and promoting the welfare of children and young people and expects all staff and volunteers to share this commitment.

Author:	Science Subject Leader
Date:	September 2025
Review Date:	September 2026

Signed :

Intent

The study of science is focused on developing an understanding of natural phenomena and the man-made world including the ways in which science impacts on people's lives and the environment. Our curriculum covers all areas of science learning, including living things, plants, humans and animals, materials; properties, changes and matter, Earth and space, forces, energy, electricity and electromagnetism and waves. Pupils are taught essential aspects of the knowledge, methods, processes and uses of science.

Learning in science is practical and hands-on and allows learners to collect first-hand evidence from observation and/or experimentation within the different areas/branches of scientific study.

In Science, learners will have the opportunity to

- experience situations in which problems are posed, having the opportunity to develop their own solutions;
- develop a working understanding of safety and care;
- formulate testable hypotheses;
- develop skills of using equipment and measurement, making decisions about when, what and how to measure;
- organise and record data and draw conclusions from results;
- develop written and oral reporting skills, alongside a scientific vocabulary to use in communicating findings and ideas.

As a result of our science curriculum, learners will become equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future. They will understand the limitations of their own experiments and develop an understanding of science being dynamic and that ideas and theories are constantly evolving even if they cannot yet be tested. International learning in science includes learning about science in different times and places and how current scientific thinking and exploration are influenced by culture, religion and attitudes to guardianship of the future.

Our aspiration is that children are inspired to be curious about natural phenomena and develop key knowledge and concepts in order to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes, both in and out of school.

To be successful, learners must:

- 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
- use of a range of materials and develop scientific skills and key techniques as part of the practical process of investigation
- evaluate materials, processes and scientific data
- develop the appropriate vocabulary and subject-specific terminology to describe
- understand the effects of science on people's lives and its impact on the wider world
- connect learning within different aspects of science and between science and other subjects (e.g. design technology, ICT)
- Engage with ethical issues associated with scientific activities and experimentation by themselves and others.

Implementation

<table>
<tr><td colspan="2">EYFS Understanding The World
Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range of children's personal experiences increases their knowledge and sense of the world around them – from visiting parks, libraries and museums to meeting important members of society such as police officers, nurses and firefighters. In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children's vocabulary will support later reading comprehension.</td></tr>
<tr><td>Toddlers and young children will be learning to:
Repeat actions that have an effect.
Explore materials with different properties.
Explore natural materials, indoors and outside.
Explore and respond to different natural phenomena in their setting and on trips.</td><td>3 and 4-year-olds will be learning to:
Use all their senses in hands-on exploration of natural materials.
Explore collections of materials with similar and/or different properties.
Talk about what they see, using a wide vocabulary.
Plant seeds and care for growing plants.
Understand the key features of the life cycle of a plant and an animal.
Begin to understand the need to respect and care for the natural environment and all living things.
Explore and talk about different forces they can feel.
Talk about the differences between materials and changes they notice.</td></tr>
<tr><td colspan="2">Children in reception will be learning to:
Explore the natural world around them
Describe what they see, hear and feel whilst outside.
Understand the effect of changing seasons on the natural world around them.</td></tr>
</table>

	Autumn Term	Spring Term	Summer Term
Y1 Science Units	**We are what we eat** We will be learning about the vital role of food in sustaining human life, as well as its importance in history and culture throughout the world. As scientists and nutritionists, we will be studying the different types and amounts of food our bodies need so that we can plan healthier diets and enjoy healthier lives.	**Sensational** Like all living things, we use our senses to experience the world around us. As we experience new things these get saved in our memory and we can build connections and begin to establish our likes and dislikes. Do you know your senses help keep you safe?	**Live and Let Live** We will be learning about living things and what they need in order to survive. How do we know what living things need? How do you know that you are alive, but a stone has never been alive?
Y1 Topic Based Science	In Science, we'll be learning about: • What living things need to survive. • Animal classification. • Habitats and living things we can find in our local area. • Different habitats around the world. • How living things are suited to the habitat in which they live. • How plants and animals depend on each other. • What a micro-habitat is and the living things we can find in them. • The nutrient cycle.	In Science, we'll be learning about: • Air resistance	In Science, we'll be learning about: • Plants that grow in our local area • The different parts of a plant • What plants need in order to grow • How to care for a plant • Where flowers prefer to live and grow • How and where seeds grow • How to set up tests to discover how plants use water • How to grow lots of different things • How beans grow • How plants and insects rely on each other
Y2 Science Units	**What's It Made of?** We will be learning about a variety of materials ranging from wood, plastic and fabric to glass, gold and steel. As scientists, we will be carrying out a series of investigations to learn more about the properties of these materials and how they can help us. Why do we use different materials to make different objects or to do particular jobs?	**Superhumans** We will be learning about how our bones, muscles, senses and nerves all connect to make us human. As scientists, we will be investigating the ways in which these body parts interact with our brain, enabling us to see, hear, smell, taste and touch.	**It's Shocking** We will be learning all about electricity and the things that we use it for on a daily basis, ranging from lights and computers to mobile phones and cars. As scientists, we will be investigating the unique features of static and current electricity and the reasons why they are so important in the modern world. How would our lives be different without electricity?
Y2 Topic Based Science	In Science, we'll be learning about: • How to test the strength of structures • How we can support structures and make them more stable		
Y3 Science Units	**How Humans Work** We will be learning about the different functions of the human body, including how we see, hear, digest, breathe and	**Material World** We will be learning about the hundreds of different materials that are used to make everyday objects. We will need to be scientists to test the properties of different materials. Some materials absorb water;	**The Nature of Life** We will be learning about where all life begins and ends. We will need to be Scientists and Technologists to investigate how all living things grow, adapt, feed and reproduce. We will need to use our International awareness to decide if all life forms matter and whether

	move. We will also investigate how to maintain a healthy lifestyle, and the effects of diet and exercise on the body	some are magnetic, and some allow electricity to pass through them. But with so many different materials to choose from, how do we decide which to use?	there are some plants or animals that are more important than another?
		Bright Sparks We will be learning about electricity and its importance on our daily lives. Can you imagine how your life would be without electricity? As scientists we will investigate how electricity flows through wires and how switches work. Do you know that there are materials that don't allow electricity to pass through them? We will also find out how electricity is produced in our countries and explore ways to save electricity.	
Y3 Topic Based Science			In Science, we'll be learning about: • Nutrients needed for a balanced healthy diet • Decomposers in nature • How food changes over time.
Y4 Science Units	**Making Waves** Sound and light are all around us – from the sound of thunder and the flash of lightning in a storm to a mobile phone ringing and flashing when someone calls us. We are surrounded by lights and sounds. But what is sound? How are sounds made? How do we see and hear? And why do we see lightning before we hear the thunder? We will need to be scientists, musicians and designers to find out all about light and sound waves!	**Feel the Force** We will be learning about forces and how they push and pull us along. We will need to be scientists to investigate different kinds of forces and learn how to measure them. Without forces nothing on Earth or in the wider Universe would start moving or once started they wouldn't stop! How do we know forces are always in action? What can we see and feel that shows us forces are at work?	**Let's Plant It!** In this unit, we will need to be 'botanists', a special kind of scientist who studies plants. We will be learning all about plants and how they grow. Plants live all over the world and without plants humans and animals would not be able to live.
Y4 Topic Based Science	In Science, we'll be learning about: • How to investigate liquid flow rates. • How the three different rock types are formed.	In Science, we'll be learning about: • The forces of pushes and pulls • Different types of simple machines • Man-made materials and their properties.	In Science, we'll be learning about: • How plants get what they need to thrive in a rainforest • Rocks and soils • Different plants and animals in the rainforest • Photosynthesis and what plants do with water • Different types of leaves • Seed dispersal • Animal classification • Food chains in the rainforest • Animal adaptations in the rainforest.

Y5 Science Units	**Fascinating Forces** We will be learning about forces and how for every action there is an equal and opposite reaction, this is what keeps an object floating on water (buoyancy) or up in the air. We will need to be scientists to investigate how surface area affects air resistance acting upon an object. We will learn the difference between mass and weight and about comparing density. We will also need to be innovators to plan and make our own powered boat using our scientific and technical knowledge. Without forces, swimmers can't swim smoothly in the pool and planes can't fly! Can we see forces? Or should we say, can we see and feel the effect of forces?	**Full Power** Electricity is one of the most important discoveries ever made and we have learned how to use it to power almost every aspect of our lives. But who discovered electricity and how does it work?	**Making New Materials** We will be learning about the marvellous materials that surround us, and how they can be shaped, combined, condensed, frozen, melted and burnt. We will need to be chemists and cooks, scientists and creators of new materials. Have you ever wondered how new materials are made? Let's find out!
Y5 Topic Based Science	In Science, we'll be finding out: • About the planets in our solar system • About mass and weight, and the effects of gravity • How to grow seeds and plants, and choose those that will be suitable for Mars • How to identify a living organism • About different energy sources • About different forces and their effects • How to choose the best energy source/s for our Mars shelter		In Science, we'll be finding out: • Where water comes from • How to grow a stalactite • How to clean water • How water can be used to make power • How rivers provide habitats for wildlife
Y6 Science Units	**Being Human** Your body is designed to help you to breathe, move, eat, respond, reproduce and live. How do the different parts of your body function and how are humans different from other animals?	**Existing, Endangered, Extinct** From tiny tadpoles to giant squid, living things exist in an amazing variety of forms. Why is there so much variety and how do scientists sort, identify and classify the millions of species living today?	**Look, Hear!** Whether we are driving around in our cars, working, or relaxing at home, we are turning on lights, music, TV, radio, computers and mobile phones. We are plugged in to sound and light 24 hours a day. But what is the science behind sound and light?
Y6 Topic Based Science	In Science, we'll be finding out: • The properties of different building materials • Types of materials that make good insulators • How we get the electricity to supply our homes.	In Science, we'll be finding out: • Investigating soils • Classifying rocks • Difference in hours of daylight around the world • How cloud cover is measured • The phases of the Moon.	

Working Scientifically

Children are encouraged to work scientifically by providing them with opportunities for different types of enquiry such as

- Fair testing
- Using models
- Research using secondary sources
- Classification
- Pattern seeking
- Sorting
- Grouping
- Observing over time

Children are encouraged to use the following skills that support them in working scientifically

- Observation
- Taking accurate results
- Recording results – graphs
- Questioning accuracy of results
- Measuring
- Using scientific vocabulary accurately
- Writing explanations
- Safe use of scientific equipment/consumables
- Asking questions
- Making predictions
- Drawing and labelling diagrams

We use the Working Scientifically Owl to provide children with prompts to help them develop their skills within enquiries.

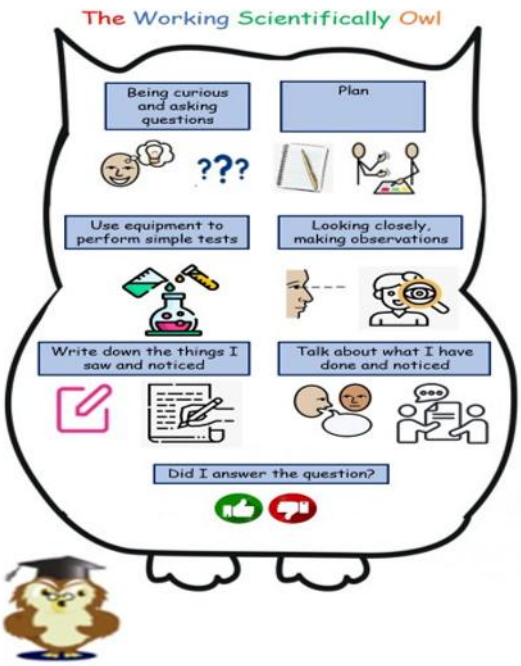
EYFS

What do you think will happen next?
I wonder what.....
I wonder why.....
I wonder how.....
I wonder when.....
I wonder if.....

'I wonder...' is the beginning of formulating questions and understanding different enquiry types. Children can then be supported to find out the answer.

Show me....
Let's do.....
How can we....?
What would happen if.....?

How can we change this?
What does it remind you of?
What is the same?
What is different?



What do you already know about?
How could we....?

I see.....
'I see...' is the beginning. Children look at the object, maybe draw it, and say what they see.

I notice.....
'I notice...' adds more detail and encourages children to put their ideas into words and select appropriate vocabulary. At this point they need to handle the object so that they can describe what they feel, hear and maybe even smell.

Look! What can you see?

Tell me what happened.
What happened when...?
What does it remind you of?

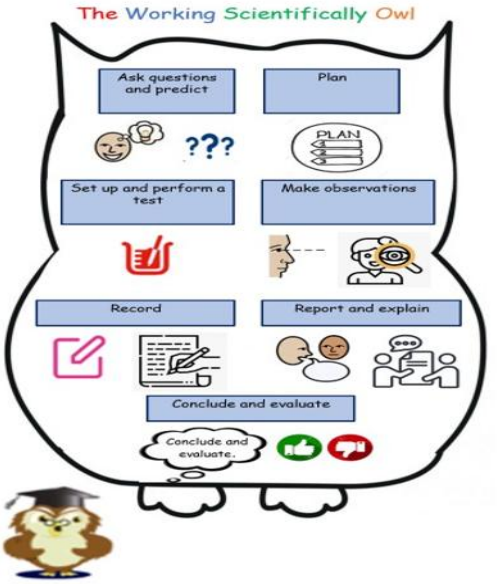
What is the same?
What is different?

KS1

What do you think will happen next?
I wonder what……
I wonder why……..
I wonder how…….
I wonder when…..
I wonder if……..

Show me….
Let's do……
How can we….?
What would happen if…..?

How can we change this?
What does it remind you of?
What is the same?
What is different?



What do you already know about?

How could we….?

I see…..
I notice…….
Look! What can you see?

Tell me what happened.
What happened when…?
What does it remind you of?

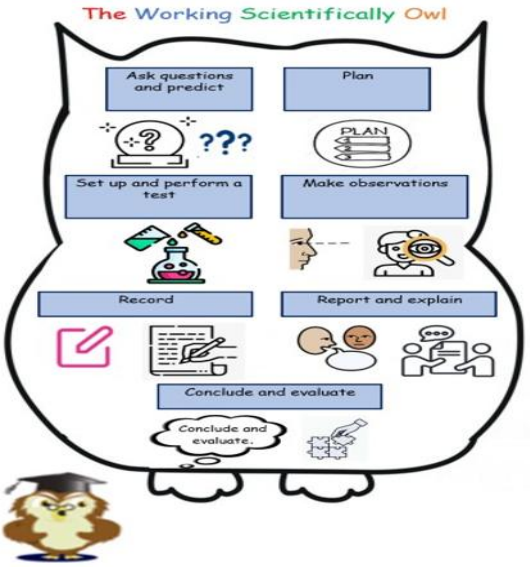
What is the same?
What is different?

LKS2

What do you think will happen next?
I wonder what……
I wonder why……..
I wonder how…….
I wonder when…..
I wonder if……..

Show me….
Let's do……
How can we….?
What would happen if…..?

How can we change this?
What does it remind you of?
What is the same?
What is different?



What do you already know about?

How could we….?

I see…..
I notice…….
Look! What can you see?

Tell me what happened.
What happened when…?
What does it remind you of?

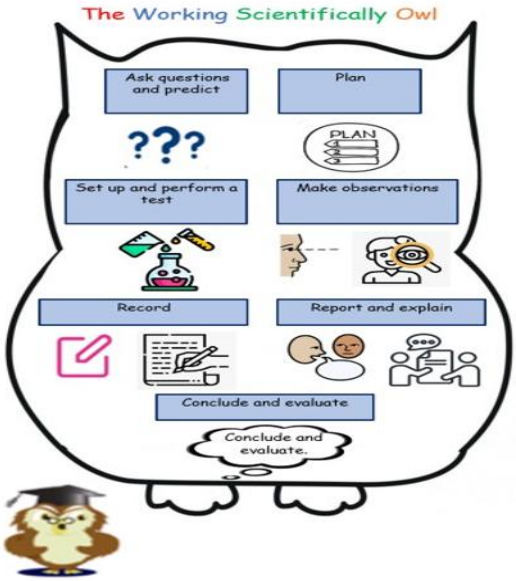
What is the same?
What is different?

UKS2

What do you think will happen next?
I wonder what……
I wonder why……..
I wonder how…….
I wonder when…..
I wonder if……..

Show me….
Let's do……
How can we….?
What would happen if…..?

How can we change this?
What does it remind you of?
What is the same?
What is different?



What do you already know about?

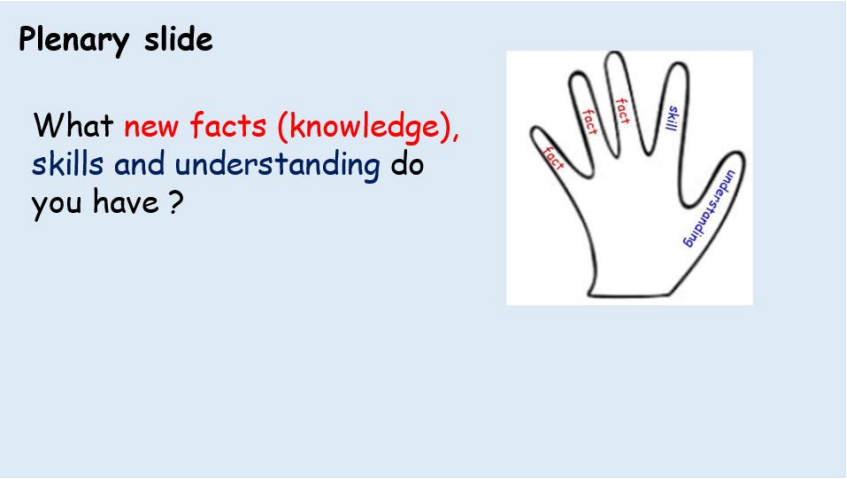
How could we….?

I see…..
I notice…….
Look! What can you see?

Tell me what happened.
What happened when…?
What does it remind you of?

What is the same?
What is different?

We provide a balance between teaching knowledge and enabling the children to deepen their understanding alongside developing the scientific skills identified above. Children will be encouraged to use the following reflection model at the end of units of work to support them in this.



Time and Organisation
Pupils also have an opportunity to develop an understanding of the subject as a whole through discrete units of work – one per term as well as part of the International Primary Curriculum where the learning goals for this subject are integrated into the topics covered. Pupils are taught in groups and as a class, according to the nature of the learning task.

- KS1 pupils will follow the Milepost 1 learning goals (KS1 NC POS)
- LKS2 pupils will follow the Milepost 2 learning goals (LKS2 NC POS)
- UKS2 pupils will follow the Milepost 3 learning goals (UKS2 NC POS)

Pupils are taught using a variety of methods that are suited to children with different abilities and interests. Use is made of:

- presentations by the teacher and other adults;
- discussion and debate;
- targeted question and answer sessions;
- individual enquiry and group investigations;
- IT and multi-media resources;
- practical work, observation and experimentation;
- educational trips and visits.

Resources

- the pond, school garden and wildlife areas within the school grounds - *gardening and pond dipping equipment and identification keys etc.*
- Technology applications/digital equipment
- Visitors and external speakers, - *lunar loan scheme, link with St. Bart's science department*
- A wide range of non-fiction texts from the school library
- A range of useful websites are used for research, and to support the acquisition of new concepts and to reinforce knowledge, skills and understanding.
- Dedicated IPC topic boxes for key topics and units of work

- the local environment in and around Newbury, educational trips and visits - *Greenham Common, Winchester Science museum, Natural History Museum, Englefield Estate visit, Brooklands Air Museum, Living Rainforest, Kew Gardens,*

Resources are stored centrally in the Science cupboard.

Outdoor Learning and Trips
Our science curriculum is enriched by trips, workshops and visits wherever possible. School trips and visits allow pupils to encounter experiences that are unavailable in the classroom. They can help pupils to develop knowledge and skills within a growing awareness and understanding of science and scientists.

Pupils' Record of Their Work
Pupils' independent and group work can be recorded in a variety of ways relevant to the type and purpose of the activity. This includes the use of photos, IPADs and other media as well as recording work in their individual science books. Occasionally work may also be produced on a larger scale and used for display or may be completed on a computer and saved.

Monitoring and Assessment
Pupils will be monitored both individually and in groups depending on the specific activities they will be undertaking. Children are encouraged to discuss their own investigations and progress in pairs or groups or as a class and are given oral feedback from their peers and their teachers. Good examples of work are demonstrated and discussed with the class. Displays, both permanent and transitory, celebrate good science work around the school and praise assemblies include science achievements.

Assessment techniques used include observation, teacher assessment of their science work, practical tasks and discussion. Their knowledge, skills and understanding will be assessed and recorded against the NC key skills and IPC learning goals for this subject. This information will form part of the annual report to parents at the end of each academic year.

Health and Safety
Teachers will be mindful of health and safety issues whilst teaching Science, and will refer to the relevant published guidelines (see Health and Safety Policy).

The school has a separate pond policy and pond risk assessment that must be read in conjunction with this policy.

THE WILLOWS PRIMARY SCHOOL

SUBJECT LEADER
Roles & Responsibilities

To monitor the subject and be able to comment on

- Standards throughout the school
- Progression of skills throughout the school

Gather evidence on the quality of provision within the subject through monitoring/evaluation

- Lesson observations/learning walks
- Work/book scrutiny
- Planning scrutiny
- Pupil/staff discussion

Monitoring activities must be agreed with HT before they take place and feedback from these activities should be discussed and agreed with HT before it is given to staff

To be able to identify the quality of provision in the subject

- Know the strengths and weaknesses of the subject
- Know the development priorities for the subject as detailed in the SDP
- Know how the SDP priorities for the subject are being addressed

To develop secure subject knowledge and keep up to date with developments in the subject from EYFS, through KS1 and across KS2

To audit and maintain subject specific resources so that the subject can be successfully delivered throughout the school

- Order replacement/new resources in liaison with HT

Report on your subject to the HT

- Verbally at meetings, when requested
- Through the end of year co-ordinator report

Co-ordinate Governor visits, when requested, following liaison with the HT

Maintain CPD of yourself and other staff with a focus on your subject area

- Feedback to other staff on CPD undertaken
- Lead staff meetings and plan INSET when requested

Maintain the subject policy for the school

- Review the policy as per the policy review schedule
- Liaise with staff in terms of reviewing the policy – amend/distribute the policy accordingly

To advise and assist staff with the teaching and learning of the subject

Maintain a Subject Leader file

In line with HT management of teacher workload, subject leaders should not request additional work from staff unless agreed by HT beforehand

Appendix 1 – National Curriculum Requirements for Science

The national curriculum for science aims to ensure that all pupils:

- 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 knowledge required to understand the uses and implications of science, today and for the future

Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. 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. Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content.

Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to maximise their pupils' engagement with and motivation to study science.

The nature, processes and methods of science

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data. 'Working scientifically' will be developed further at key stages 3 and 4, once pupils have built up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.

Spoken language

The national curriculum for science reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. They must be assisted in making their thinking clear, both to themselves and others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

The programmes of study for science are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study.

Key stage 1

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.

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

Working scientifically

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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

Year 1 programme of study

Plants

Pupils should be taught to:

- 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

Animals, including humans

Pupils should be taught to:

- 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

Everyday materials
Pupils should be taught to:
- 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

Seasonal changes
Pupils should be taught to:
- observe changes across the 4 seasons
- observe and describe weather associated with the seasons and how day length varies

Year 2 programme of study

Living things and their habitats
Pupils should be taught to:
- 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

Plants
Pupils should be taught to:
- 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

Animals, including humans
Pupils should be taught to:
- 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

Uses of everyday materials
Pupils should be taught to:
- 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

Lower key stage 2 – years 3 and 4

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.

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

Working scientifically

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.

Year 3 programme of study

Plants

Pupils should be taught to:

- 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

Animals, including humans

Pupils should be taught to:

- 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

Rocks

Pupils should be taught to:

- 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

Light

Pupils should be taught to:

- 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

Forces and magnets

- compare how things move on different surfaces
- notice that some forces need contact between 2 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 2 poles
- predict whether 2 magnets will attract or repel each other, depending on which poles are facing

Year 4 programme of study

Living things and their habitats

Pupils should be taught to:

- 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

Animals, including humans

Pupils should be taught to:

- 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

States of matter

Pupils should be taught to:

- 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

Sound

Pupils should be taught to:

- 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

Electricity

Pupils should be taught to:

- 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

Upper key stage 2 – years 5 and 6

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.

Pupils should read, spell and pronounce scientific vocabulary correctly.

Working scientifically

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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 a 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

Year 5 programme of study

Living things and their habitats
Pupils should be taught to:
- 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

Animals, including humans
Pupils should be taught to:
- describe the changes as humans develop to old age

Properties and changes of materials
Pupils should be taught to:
- 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

Earth and space
Pupils should be taught to:
- 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

Forces
Pupils should be taught to:
- 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 programme of study

Living things and their habitats
Pupils should be taught to:
- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- give reasons for classifying plants and animals based on specific characteristics

Animals including humans
Pupils should be taught to:
- 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

Evolution and inheritance
Pupils should be taught to:
- 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

Light
Pupils should be taught to:
- 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

Electricity
Pupils should be taught to:
- 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

Appendix 2 – IPC Learning Goals for Science

Strand	Milepost 1	Milepost 2	Milepost 3
Scientific inquiry	**1.01** Be able to identify ways of finding out about scientific questions in familiar contexts	**2.01** Be able to suggest ways of collecting evidence in response to a scientific question	**3.01** Be able to choose an appropriate way (research review, simulation or experimentation) to investigate a scientific issue
	1.02	2.02	3.02
	1.03 Understand that science provides evidence, not proof	**2.03** Understand the importance of collecting scientific evidence through observation and testing	**3.03** Understand the limitations of scientific investigation
	1.04 Be able to follow guided experiments to try to answer scientific questions	**2.04** Be able to ask scientific questions	**3.04** Be able to suggest testable questions
	1.05 Be able to connect scientific investigations to familiar contexts	**2.05** Be able to connect scientific investigations to real life	**3.05** Be able to generate a hypothesis
	1.06 **Be able to suggest independent variables to test in a guided investigation**	**2.06** **Be able to plan an investigation changing only one independent variable**	**3.06** **Be able to plan a fair (test) investigation**

Strand	Milepost 1	Milepost 2	Milepost 3
Scientific inquiry	**1.07** **Be able to make predictions**	**2.07** **Be able to make informed predictions**	**3.07** **Be able to make predictions related to the independent variable**
	1.08 **Be able to use the senses safely to make observations**	**2.08** **Be able to identify potential risks in a planned investigation**	**3.08** **Be able to conduct science investigations safely**
	1.09 Be able to make observations and take informal measurements	**2.09** Be able to make and record observations and take formal measurements	**3.09** Be able to take systematic and accurate measurements or observations using the most appropriate tools and conventions
	1.10 Be able to compare results	**2.10** Be able to describe observations and results identifying possible patterns	**3.10** Be able to analyse observations and results identifying those that are more or less significant
	1.11 **Be able to compare results with predictions**	**2.11** **Be able to compare results to predictions and draw conclusions**	**3.11** **Be able to draw conclusions based on results and compare to original hypotheses and the real world**
	1.12 **Be able to describe the method and results**	**2.12** **Be able to record and describe the method and results in a variety of ways**	**3.12** **Be able to record the method and results including tables, graphs, diagrams and/or models**

Strand	Milepost 1	Milepost 2	Milepost 3
Scientific inquiry	**1.13** **Be able to suggest improvements to investigations**	**2.13** **Be able to compare investigations and results identifying possible anomalies**	**3.13** **Be able to evaluate investigations for fairness and suggest improvements**

Strand	Milepost 1	Milepost 2	Milepost 3
Humans and animals	**1.14** Know the names of the main external body parts of humans and animals	**2.14** Know about the functions of skeletons and muscles in humans and some other animals	**3.14** Know the functions of the major internal and external parts of the human body
	1.15 Know the names of the senses and the organs connected to them	**2.15** Be able to describe the process of digestion	**3.15** Be able to describe some of the connections between systems in the human body
Plants	**1.16** Know that plants need light and water to grow	**2.16** Know about the functions of the major parts of a plant	**3.16** Know about factors that affect the growth of plants
	1.17 Know the names of the parts of plants	**2.17** Know how the parts of a plant may change over time	**3.17** Know that photosynthesis requires carbon dioxide and results in the excretion of oxygen
	1.18 Know that seeds can grow into plants	**2.18** Know the lifecycle of various plants	**3.18** Know about pollination, fertilisation and methods of seed dispersal

Strand	Milepost 1	Milepost 2	Milepost 3
Living things	**1.19** Know some differences between living things and things that have never been alive	**2.19** Know that a key difference between non-living and living things is that living things grow and reproduce	**3.19** Know the seven characteristics which define living things
	1.20 Be able to sort living things in simple ways by features and behaviours	**2.20** Be able to sort animals into vertebrates and invertebrates	**3.20** Be able to identify an animals' class according to its features and behaviours
	1.21 Know that eating food provides the body with energy	**2.21** Know that the sun is the source of energy in all food chains	**3.21** Know the names of different types of consumers and the different levels within a food chain
	1.22 Be able to sequence given food chains	**2.22** Be able to draw diagrams to illustrate simple food webs and chains in an ecosystem	**3.22** Be able to predict the outcome of disruption to a food chain
	1.23 Know what all living things need to survive	**2.23** Know how space and place impact on the health of living things	**3.23** Know the influences on the quality of life for living things
	1.24 Understand that people share environments with other living things	**2.24** Understand the positive and negative impacts humans have on other living things	**3.24** Understand the effects that changes in the environment may have on living things

Strand	Milepost 1	Milepost 2	Milepost 3
Living things	**1.25** Understand that different locations support different living things	**2.25** Understand how animals and plants are physically suited to particular environments	**3.25** Understand how plants and animals adapt their behaviour in particular environments
	1.26	2.26	**3.26** Know that there is evidence that animals have changed or become extinct over time
	1.27 Know about similarities and differences between humans and other creatures	**2.27** Know that there are physical similarities and differences between themselves and other people	**3.27** Know that some characteristics of humans and other animals are inherited from their parents
	1.28 Know the basic nutrient groups and example foods for each group	**2.28** Know the role of the different nutrients in the body	**3.28** Know the possible impact of too much or too little of a particular nutrient
	1.29 Understand the interdependence between plants and animals, humans and animals & human and plants	**2.29** Understand the interdependence between all living things	**3.29** Understand the consequences of imbalance in an ecosystem

Strand	Milepost 1	Milepost 2	Milepost 3
Properties	**1.30** Know the names and basic properties of a range of materials	**2.30** Know a range of testable properties	**3.30** Know which properties to test to see if materials are suitable for a purpose
	1.31 Be able to sort materials into groups according to their observable properties	**2.31** Be able to compare common materials and objects and their properties	**3.31** Be able to group and classify materials according to testable properties
	1.32 Understand that what we use materials for is dependent upon their properties	**2.32** Understand that different materials are suited to different purposes	**3.32** Understand that changing some materials makes them more or less suitable for their purposes
	1.33 Know that temperature is a measure of heat	**2.33** Know that some materials conduct heat more effectively than others	**3.33** Know that insulators are designed to maintain temperature, whether it be hot or cold
	1.34	2.34	3.34
	1.35	2.35	3.35

Strand	Milepost 1	Milepost 2	Milepost 3
Properties	1.36	2.36	**3.36** Know that substances can be classified as acid or alkali and that acidity can be measured
Matter	1.37	2.37	**3.37** Know that matter is made up of particles
	1.38	2.38	3.38
	1.39 Be able to compare solids and liquids	**2.39** Be able to compare solids, liquids and gases	**3.39** Be able to describe and illustrate the different arrangements of particles in solids, liquids and gases

Strand	Milepost 1	Milepost 2	Milepost 3
Changes	**1.40** Know that there are different ways to change materials	**2.40** Know that some changes are reversible and some are irreversible	**3.40** Know that there are different ways to reverse a selection of changes
	1.41	**2.41** Know that some substances dissolve in liquids and others do not	**3.41** Know the basic factors that affect solubility
	1.42 Be able to observe how things change when water is added	**2.42** Be able to separate insoluble solids from liquids	**3.42** Be able to separate simple mixtures
	1.43	**2.43** Know that heating or cooling can bring about a change of state	**3.43** Know that different amounts of heating or cooling are required to bring about a change of state
	1.44	2.44	3.44
	1.45	2.45	**3.45** Know that elements cannot be broken down into smaller parts
	1.46	2.46	3.46

Strand	Milepost 1	Milepost 2	Milepost 3
Earth and space	**1.48** Understand that the position of the sun in the sky appears to change during the course of a day	**2.48** Understand that day and night are caused by the Earth spinning on it's own axis	**3.48** Understand that the position of the sun in the sky appears to change during the course of a day and this is different over the course of a year
	1.49 Know that the Moon is not a source of light	**2.49** Know that the Moon appears to change shape over the course of a month and is repeated every month	**3.49** Know the names of the phases of the Moon
	1.50 Know that the Sun, Earth and Moon are (approximately) spherical	**2.50** Know that the Sun is a star at the centre of our solar system	**3.50** Know that patterns of stars in constellations stay the same
	1.51 Know that the time taken for the Earth to orbit the Sun is equal to one year	**2.51** Know that seasons are caused by the combination of Earth's orbit around the sun and the tilt of its axis	**3.51** Know that planets take different lengths of time and paths to orbit the Sun
	1.52	**2.52** Understand that the Earth is part of a system of planets that orbit around the same star	**3.52** Understand how the Earth meets the conditions for sustaining human life

Strand	Milepost 1	Milepost 2	Milepost 3
Earth and space	1.53	2.53	**3.53** Be able to use weight and mass correctly in experiments
	1.54	2.54	**3.54** Know that a force called gravity keeps things on the ground
Energy	**1.55** Know that food is a store of energy	**2.55** Know that heat, light, sound and movement are evidence of energy transfer taking place	**3.55** Know that chemical, electricity and movement (kinetic) are stores of energy
	1.56	**2.56** Know that materials conduct heat differently to each other depending on what they're made of	**3.56** Know that conductors and insulators affect the rate of heat energy transfer
	1.57 Be able to predict some impacts on our lives if electricity were no longer available	**2.57** Be able to give reasons why we should save/conserve electricity	**3.57** Be able to compare a renewable and non-renewable way of producing electricity
	1.58 Know which everyday appliances use electricity	**2.58** Know that electricity is something which is generated	**3.58** Know that different appliances consume different amounts of energy to do different tasks

Strand	Milepost 1	Milepost 2	Milepost 3
Electricity and electromagnetism	**1.59** Know that a circuit has to be complete to work	**2.59** Know the names of the components and the related symbols in a circuit	**3.59** Know the names of types of circuit
	1.60 Be able to build a simple circuit to make devices work	**2.60** Be able to use electrical circuits to investigate the conductivity of various materials	**3.60** Be able to draw and build series and parallel circuits

Strand	Milepost 1	Milepost 2	Milepost 3
Electricity and electromagnetism	1.64	2.64	3.64
	1.65 Know about some uses of magnets in society	**2.65** Know about the principles of magnets and how to test materials for magnetic properties	**3.65** Know that bar magnets have two poles and that opposite poles attract

Strand	Milepost 1	Milepost 2	Milepost 3
Waves	1.66	2.66	3.66
	1.67 Know that sounds are made when objects vibrate	**2.67** Know how sounds are changed by altering the nature of vibrations	**3.67** Know that sounds requires a medium to travel through
	1.68 Understand how humans have made use of sound and light sources	**2.68** Understand that light and sound travel at different speeds	**3.68** Understand some of the risks associated with light and sound
	1.69 Know that darkness is the absence of light	**2.69** Know that we see things because light travels from a source and reflects from an object into our eyes	**3.69** Know that light travels in a straight line until it hits an object
	1.70 Be able to predict the shape of a shadow that blocks the passage of light from a source	**2.70** Be able to predict how the shape of a shadow would change based upon the distance of the light source	**3.70** Be able to predict how the shape of the shadow would change depending on the position of the light source relative to the object
	1.71	**2.71** Know the order of colours in the visible spectrum/rainbow	**3.71** Know that white light is a mixture of all of the colours in the visible spectrum

Strand	Milepost 1	Milepost 2	Milepost 3
Waves	1.72	2.72	**3.72** Understand why the eye changes in response to light and dark

Strand	Milepost 1	Milepost 2	Milepost 3
Forces	**1.73** Know how pushes and pulls can move an objects	**2.73** Know how pushes and pulls can temporarily or permanently change the shape of an object	**3.73** Know the five possible effects a force can have
	1.74 Be able to create push and pulls of different strengths	**2.74** Be able to compare forces, stating which is stronger	**3.74** Be able to measure forces using a Newton meter
	1.75 Understand how air resistance can slow or hinder movement	**2.75** Understand why we need friction	**3.75** Understand how friction and air resistance impact on movement
	1.76	2.76	**3.76** Know the forces involved in the stretching and squashing of springs and elastic bands
	1.77	**2.77** Know that forces have a direction	**3.77** Know that a fulcrum provides a pivot point

Strand	Milepost 1	Milepost 2	Milepost 3
Waves	1.79	2.79	3.79
	1.80	**2.80** Be able to identify simple machines in their environment	**3.80** Be able to sort simple machines by how they work