Progression Map

Science

3 I's: Intent, Implementation, Impact

Intent
Working in a scientific manner with a genuine curiosity and interest in the world around them whilst developing skills to explore those things is the hope for our pupils as scientists now and in the future. In the Thread Knowledge document our key drivers provide a framework for learning and help to deepen children's understanding of what is taught. Threads have been created within the drivers that are big, transferable ideas that have a real world meaning and help our pupils make sense of the world around them, preparing them for life in modern Britain. In science, threads for example include leadership, respect and tolerance, belonging, healthy lifestyle, equity and aspiration and caring for the planet. Our science curriculum supports the development of deepening pupils' understanding of the key scientific concepts and ideas taught, alongside skills required for being a scientist. Developing skills around observation and measurements, recording data and presenting findings enables pupils to decide whether their findings support predictions or ideas. This is before practical investigations take place. It is school's intent that pupils develop a rich body of knowledge about the world around them in the biology curriculum, they will have explored sound, electricity and forces in the physics curriculum; they will have developed a good understanding of states of matter and how they change in the chemistry curriculum. Over time at Northfield Primary School the knowledge, skills and understanding will be woven together to enable pupils to be scientists, working scientifically. The children learn about scientists, who have pursued this subject, committing themselves to life-long learning and work developing their expertise, in modern Britain. Our science curriculum also aims to provide pupils with the knowledge needed to be healthy, teaching them about the impact of diet, exercise, hygiene, drugs and lifestyle on their bodies and how they can live a healthy life, which is a focus for the 'be healthy' school key driver. Therefore, by Year 6, pupils will have a deeper understanding of the scientific ideas taught as part of our curriculum to prepare them for KS3 and beyond. They will ask questions about the world around them and know a variety of different methods to use to collect evidence, along with the skills needed to plan and carry out investigations, collect, record, analyse and present data and to draw conclusions about what they have found out. Children will also know a diverse range of scientists, who have committed or continue to commit their life to the world of science, and how their work has impacted or impacts on community, being healthy, learning and the four corners of the world – the 4 key drivers at Northfield.

Implementation
• As a school, the Early Years Foundation Stage (EYFS) follows the 'Development Matters in the EYFS' guidance. Years 1 to 6 follow the programmes of study set for their year group the National Curriculum (2014), and our progression plan document, which focuses on the integration of disciplinary and substantive knowledge. • Science is taught weekly in years 1 to 6. Lessons, which are planned around science topics, are sequential and build on prior knowledge and substantive learning. 'Working Scientifically' objectives have been identified for each year group to ensure progression across the school. • As with all teaching and learning at Northfield Primary, science lessons will take into consideration the needs of all pupils including the disadvantaged pupils, SEND pupils and EAL pupils. • Themes and concepts are revisited frequently, including using retrieval tasks, as we want our learners to make strong learning links within and across science learning. • Key knowledge and vocabulary is evident with lessons incorporating a key scientific question and scientific vocabulary. Dual-coded scientific vocabulary is clearly displayed in classrooms to support building pupil knowledge. • By embedding disciplinary and substantive learning, children will be able to formulate their own scientific explanations and they will be given the opportunity to apply this knowledge when answering the enquiry focus of their learning. • Pupil's knowledge is assessed using a 10-mark assessment; results can identify gaps in learning providing a clear picture for re-teaching to build strong science foundations for all pupils. • Teaching will be supported with quality resources and experiences, such as visits with a science focus alongside encouraging visitors to come into the school and talk about science.
Impact
From teaching an Early Years pupil all the way through to Year 6 Northfield pupils will be interested in what they are learning. Their curiosity about the natural world will have been explored and developed to foster a life-long interest, care and appreciation of their world: at school, in the local area, nationally and globally along with science in general. They will be able to ask and answer questions, plan and carry out investigations, collect, record, analyse and present data and draw conclusions. Pupil progress will be evident in science as they can evidence and articulate complex scientific concepts with clarity with confidence. They will retain prior learning, making connections between prior and current learning alongside making connections to other areas of the curriculum. Pupils will develop a secure understanding of scientific concepts too. Pupil's ability to know and remember more, with a clear understanding and skill development, will foster an appreciation of what science can and does offer, in modern Britain, including opportunities for themselves.

National Curriculum

National Curriculum Aims
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
Key Stage 1
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

Lower Key Stage 2
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.
Upper Key Stage 2
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

	Science Curriculum Map					
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	Everyday Materials	Animals, including Humans (senses)	Seasonal Change	Animals, including Humans (Animals)	Plants	
Year 2	Uses of Everyday Materials		Animals, including Humans		Living Things and their Habitats	Plants
Year 3	Light	Animals, including Humans	Rocks and Soils	Plants/scientists		Magnets and Forces
Year 4	Electricity	Animals including Humans	States of Matter/ Living Things and their Habitats		Living Things and their Habitats	Sound
Year 5	Forces	Properties and Changes of Materials		Living Things and their Habitats	Animals, including Humans	Earth and Space
Year 6	Light	Electricity	Living Things and their Habitats	Evolution and Inheritance	Animals, including Humans (Heart and Health)	Animals, including Humans (Blood and transportation)

EYFS Progression Map – Becoming a Scientist

Understanding the World- The Natural World

ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants, know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class, understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

EYFS baseline	End of Autumn	End of Spring	End of EYFS (ELG's)	Year 1 National Curriculum
I can talk about what I see using a wide vocabulary.	I can describe what I see, hear, and feel whilst outside.	I can talk about changes I can see in the natural world around me.	I can explore the natural world around me, making observations and drawing pictures of animals and plants.	I can identify and name a variety of common wild and garden plants. I can describe and compare the structure of a variety of common animals. I can ask simple questions. I can observe closely.
I can identify different types of weather. I can explore collections of materials with similar/different properties. I can talk about the differences between materials and changes I notice.	I can talk about Autumn, I can begin to understand the effect of changing seasons on the natural world around me e.g., autumn into spring. I can describe different materials such as wood, plastic, metal, glass and the textures.	I can talk about the seasons. I understand the effect of changing seasons on the natural world around me e.g. winter into spring. I can talk about changing states of matter e.g. freezing and melting, heating and cooling. I can talk about forces e.g. push/pull, float/sink.	I understand some important processes and changes in the natural world around me, including the seasons and changing states of matter.	I observe changes across the four seasons. I can describe weather associated with the seasons and how day length varies. I can describe the physical properties of a variety of everyday materials.
I enjoy looking at how animals and plants change.	I can talk about how animals and plants change.	I can talk about the life cycle of a plant and animal.	I understand and can talk about the life cycle of a plant and animal.	I can identify and name a variety of common wild and garden plants. I can describe and compare the structure of a variety of common animals.

	Topic	Lesson sequence	Substantive knowledge	Disciplinary knowledge	Key vocabulary
Year 1					
Autumn 1	Everyday Materials	1) To explain the difference between an object and the material it is made from. What is the difference between an object and a material? 2) To identify the material that an object is made from. What is the difference between an object and a material? 3) To describe simple physical properties of materials. Which materials are the most flexible? Which materials are waterproof? 4) To compare a variety of everyday materials and make prediction. Which material is most suitable to use to make an umbrella for Teddy? 5) To perform simple tests. Which material is most suitable to use to make an umbrella for Teddy? 6) To answer a question after performing simple tests. Which material is most suitable to use to make an umbrella for Teddy?	• All objects are made from one or more e.g. wood, plastic, glass, metal, water and rock (show pictures on slide) • Some objects are made from more than one material. • Materials can be described by their properties eg. shiny, smooth, stretchy (show pictures) • The name of an object is not the material it is made of.	**Asking and answering scientific questions** To begin to use scientific vocabulary to ask and answer simple questions. **Making Predictions** To say what they think might happen in an investigation. **Setting up and carrying out tests** To follow instructions to perform a simple test. **Observing and measuring** To observe objects and material and describe what can see or feel. **Identifying and classifying** To sort and group objects and materials with help, according to simple observational features. **Recording and presenting data** To gather and record simple data.	Object, material, wood, plastic, glass, metal, water, rock, hard, soft, stretchy, bendy, stiff, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull Distinguish, identify, name, describe, compare, discuss, match, predict, test, select, classify and group

Autumn 2	Animals, including humans	1) To label basic parts of the human body. Do we all have the same body parts? 2) To label different facial features. What features do you have on your face? How are your features similar to your partner's features? 3) To compare body parts. Does somebody's height mean they will have bigger or smaller hands? 4) To name and use the five senses. What are our five senses and how do we use them? 5) To identify which body part is associated with each sense. Which parts of our body do we use for each of our five senses? 6) To name basic parts of the human body. What different body parts do I have?	• Know that the head, legs, arms, torso, hips, feet, toes, hands and fingers are part of the human body and can identify them (show pictures). • The 5 senses are touch, see, smell, taste and hearing. • You taste with your tongue. • You feel with your skin. • You smell with your nose. • You see with your eyes. • You hear with your ears.	**Asking and answering scientific questions** To begin to ask and answer simple scientific questions using simple scientific vocabulary. **Making Predictions** To begin to say what they think might happen. **Observing and measuring** To describe what they can see, touch, smell, hear or taste. **Recording and presenting data** To talk about their finding and explain what they have found out about. To begin to record simple observations.	Head, body, eyes, ears, mouth, teeth, legs, knees, feet, arms, hands etc. senses, touch, see, smell, taste, hear, fingers, skin, eyes, nose, ears, tongue Identify, name, observe, explain, predict, test, record, sort, classify,

Spring 1	Seasonal change	1) To identify the four seasons and compare day lengths across the seasons. What are the names of the four seasons? 2) To know which months fall within each season. Which months fall in each season? 3) To observe changes between autumn and winter. How is autumn different to winter? 4) To observe changes between winter and spring. What changes happen between winter and spring? 5) To observe changes between spring and summer. What changes happen between spring and summer? 6) To observe changes between summer and autumn. What changes happen between summer and autumn?	• The four seasons are autumn, winter, spring and summer. • The days are longer in the summer and shorter in the winter. • The weather changes with the seasons. In the UK, it is normally colder and rainier in the winter and hotter and drier in the summer. • In Spring, many animals have babies. Leaves start to grow again on trees and flowers begin to bloom. • In summer, trees have leaves on them. • In Autumn, leaves on some trees change colour and fall off. • Winter some trees have no leaves on them.	**Observing and measuring** To describe what we can see, hear, feel and smell. **Identifying and classifying** To sort and group according to simple observational features. **Recording and presenting data** To begin to record simple data. **Concluding** To talk about their findings and explain what they have found out. **Analysing and evaluating** To use every day or simple scientific language to ask and/or answer a question on given data.	weather; sunny; rainy; windy; cloudy Seasons; winter; spring; summer; autumn Sun; sunrise; sunset; day length

Spring 2	Animals, including humans (Animals)	1) To name animals in their local environment and the wider world. Which animals live in our local environment? 2) To explain and group the structure of a variety of common animals. How are these animals similar/ different? 3) To identify and compare animal body parts and features. How are these animals similar/ different? 4) To explain that animals have different diets. Do all animals eat the same thing? 5) To compare animals at the zoo. How are zoo animals similar/ different? 6) To explain that animals eat different things to survive. How are animals' diets different?	• There are a variety of common animals: dog; cat; horse; lion; pig; owl; snake; fish; frog. • Some animals eat meat. • Some animals eat plants. • Some animals eat both plants and meat. • Animals vary in many ways and have different structures, eg. wings, tails, ears. • Animals have a variety of different skin coverings eg, feathers, fur, scales. • These features can be used to group and identify animals.	**Asking and answering scientific questions** To ask simple questions, some of which they have thought of themselves. **Observing and measuring** To observe living things and describe what they can see. **Identifying and classifying** To sort and group living things according to their features. To sort and group living things according to their diets. **Concluding** To explain, with help, what they think they have found out.	Head; body; eyes; ears; mouth; teeth; leg; tail; wing; claw; fin; scales; feathers; fur; beak; paws; hooves; animals Identify, name describe, compare, match, explain, group, sort, classify, discuss, research, observe, record,

Summer 1/ Summer 2	Plants	1) To identify the basic structure of trees. How is a tree different to a flower? 2) To name and identify deciduous trees. Which deciduous trees can I spot around school? 3) To name and identify evergreen trees. What different evergreen trees can you name? 4) To name and compare deciduous and evergreen trees. What is the difference between deciduous and evergreen trees? 5) To describe how some trees change throughout the different seasons. How does a tree change in each season? 6) To identify deciduous and evergreen trees. What are deciduous and evergreen trees? 7) To identify the basic structure of common flowering plants and understand how plants grow. What are the basic parts of the plant? 8) To name common garden plants and compare their structures. Do common garden plants have similar structures? 9) To identify common garden plants. What plants might grow in a garden? 10) To name common wild plants and compare their structures. How is the structure of different wild plants similar/ different? 11) To identify common wild plants. What common wild plants are there in our local environment? 12) To name and compare common garden and wild plants. How are common garden and wild plants similar/different?	• There are a variety of garden and wild plants: rose; tulip; lavender; sunflower; buttercup; dandelion; daisy; nettle. (add some names of deciduous and evergreen trees) • The parts of a flower are: roots; stem; leaves; crown. • The parts of a tree are: roots; trunk; branches; leaves; buds/flowers. • Deciduous trees do not have leaves in every season/all year round. • Evergreen trees keep their leaves throughout every season/all year round.	**Asking and answering scientific questions** To begin to use simple scientific vocabulary to ask and answer scientific questions. **Observing and measuring** To begin to record simple data. To observe living things and describe what they see, touch, smell, hear or taste. **Identifying and classifying** To sort and group living things, with help, according to simple observational features. **Recording and presenting data** To talk about their findings and explain what they have found out. **Concluding** To explain, with help, what they think they have found out. **Analysing and evaluating**	

Year 2					
Autumn 1 and 2	Materials	1) To identify and name wood, plastic, glass, metal and rock. What is a material? 2) To describe the simple physical properties of wood, plastic, glass, metal, and rock. How are materials different? 3) To identify and describe the suitability of wood, plastic, glass, metal, rock, paper and cardboard. Why are different materials used to make different objects? 4) To investigate how solid objects can be changed by squashing, bending, twisting and stretching. Which materials can change their shape? 5) To identify how materials can be shaped. Why should materials change in different ways? 6) To categorise and describe materials. Do different objects made from the same material have the same properties? 7) To invent a new use for a given material How could you make that material more useful? 8) To investigate the suitability of wood, plastic, glass, metal, water, rock, paper and cardboard. Which of these materials will make the best tent cover? 9) To test materials to see if they are rigid or flexible. What makes a material rigid or flexible? 10) To test the suitability of rigid materials for a specific purpose Which material would make a good bridge for a toy car? Why?	• Wood, metal, plastic, glass, brick, rock, paper and cardboard are all different types of materials. • Objects can be made from more than one material e.g. scissors have metal blades and plastic handles. • Materials have different properties e.g hard, soft, strong. • The same materials can be used in many ways e.g. wood: fences, tables, doors. • Solid objects can change shape by squashing, bending, twisting and stretching.	**Asking and answering scientific questions** To use scientific vocabulary to ask and answer a question. To know that scientific questions can be answered in a variety of different ways. **Making Predictions** To make predictions about what might happen. **Setting up and carrying out tests** To do things in order when carrying out a simple test and begin to recognise when something is unfair. **Observing and measuring** To observe something closely and describe changes. To use simple equipment, such as a ruler, to measure. **Identifying and classifying** To group objects according to their materials. **Recording and presenting data** To record in a variety of ways and talk about their findings using scientific vocabulary. **Concluding** To use scientific knowledge to explain what they have found out. **Analysing and evaluating** To identify simple relationships using simple comparative language.	Wood, plastic, glass, metal, water, rock, rigid, flexible, rough, smooth, hard, strong, push, pushing, pull, pulling, twist, twisting, squash, squashing, bend, bending, stretch, stretching, shape, transparent, translucent, opaque, stretchy, squashy, elastic, stiff, comparative testing, interpret results, waterproof, predict, non-reflective, reflective,

Spring 1 and 2	Animals, including humans	1) To know that human offspring grow into adults. How do I grow? 2) To know the basic needs of animals including humans for survival (water, food, air). What do I need to survive? 3) To describe the importance of eating the right amounts of different types of food. Which foods keep me healthy? 4) To describe the importance of hygiene. Why do I need to keep myself clean? 5) To explore the impact of exercise on the body Why should I exercise? 6) To identify and name a variety of common animals. What are these common animals? 7) To know that animals have basic needs. How are the animals at Matlock Farm Park cared for? 8) To know that animals including humans have offspring that grow into adults. Which animal will this offspring grow into? 9) To know that animals go through a life cycle. How do caterpillars change during their life cycle? 10) To describe the basic needs of animals for survival What do animals need to survive?	• Animals have offspring which grow into adults e.g chick – chicken, kitten – cat. • Adults have babies that grow into adults. • Animals and humans need water, food and air to survive. • Exercise is important for your health. • Humans need to eat different types of food to be healthy. • It is important to wash your body and clean your teeth to have good hygiene.	**Asking and answering scientific questions** To ask and answer scientific questions using scientific vocabulary. To know that questions can be answered in a variety of different ways, including through using secondary sources. **Setting up and carrying out tests** To do things in the correct order when performing a simple test. **Observing and measuring** To observe something closely and describe changes over time. **Identifying and classifying** To decide, with help, how to group foods and living things and begin to see patterns. **Recording and presenting data** To gather, record and talk about their findings in a variety of ways, using simple scientific vocabulary. **Concluding** **Analysing and evaluating** To identify simple patterns and relationships using simple comparative language.	Survive, survival, water, food, air, exercise, heart beat, breathing, hygiene, germs, disease, basic needs, meat, fish, vegetables, bread, rice, pasta, dairy, Names of animals and their babies (sheep – lamb), offspring, growth, human, baby, toddler, child, teenager, adults, old person, reproduction, growth, life cycle

Summer 1	Living things and their habitats	1) To explore habitats around the school grounds. What habitats can we find around the school grounds? 2) To classify whether things are living, dead or never been alive. Are these things living, dead or have they never been alive? 3) To understand that most living things live in habitats to which they are suited to, What animals can we find underneath a log? 4) To describe how animals, obtain their food from plants and other animals, using the idea of a simple food chain. 5) To identify and name different sources of food. Where do animals find food? 6) To know how to set up a fair test (making a choice chamber). What kind of habitat do woodlice prefer? 7) To identify and name the basic structure of plants and trees. What are the main parts of the plants in our school environment? 8) To describe how plants need water, light and suitable temperature to grow and stay healthy. What are the best conditions for a plant to grow? 9) To observe and describe how seeds and bulbs grow into mature plants How does a seed or bulb mature into a plant? 10) To understand that plants need sufficient growing conditions and to know where food comes from What do we need to do to these plants to help them grow? 11) To reflect on observing seeds / plants growing in different conditions. Which plants grew the most and why?	• All objects and living things can be sorted into the following: living, dead or have never been alive. • A habitat is where an animal or a plant lives. • There is more than one type of habitat e.g. forests, sea and under the ground. • A microhabitat is a very small habitat e.g. under a log/pile of leaves. • Animals get their food from plants and other animals. • A food chain shows how each living thing gets its food.	**Asking and answering scientific questions** To know that questions can be answered in a variety of ways, including using secondary sources and video clips. To ask and answer scientific questions using simple scientific vocabulary. **Making Predictions** To make a prediction about what might happen. **Observing and measuring** To observe something closely and describe changes over time. To use simple equipment, including a hand lens, a magnifying glass and a ruler, **Identifying and classifying** To sort living things. **Recording and presenting data** To gather data and present in a variety of ways. **Concluding** To use simple scientific knowledge and vocabulary to explain what they have found out. **Analysing and evaluating** To identify simple patterns and relationships using simple comparative language.	Living, dead, never alive, habitats, micro habitats (under logs, bushes), food, food chain, producer, consumer, sun, plants, animals, healthy, shelter, conditions, hot/warm/cold, dry/damp/wet, bright/shade/dark, suited, suitable, basic needs, survive, local habitats eg pond / woodland, names of living things in the habitats and microhabitats studied

Summer 2	Plants	1) To recall the basic structure of plants and trees and their common names. What are the main parts of the plants in our school environment? 2) To describe how plants need water, light and suitable temperature to grow and stay healthy. What are the best conditions for a plant to grow? 3) To observe and describe how seeds and bulbs grow into mature plants How does a seed or bulb mature into a plant? 4) To understand that plants need sufficient growing conditions and to know where food comes from Where does our food come from? 5) To reflect on observing seeds / plants growing in different conditions Which plants grew the most and why?	• Seeds and bulbs grow into fully grown plants. • Plants need water, a suitable temperature and light to survive and stay healthy. • Plants have different stages of growth e.g seed, seedling, fully grown.		Deciduous, evergreen, trunk, branches, leaf, leaves, bud, flowers, petals, root, stem, grow, healthy, bulb, seed, water, light, shade, warm, space, suitable, temperature, germination, reproduction, germinate, shoot, seedling

Year 3					
Autumn 1	Light	1) To recognise that dark is caused by the absence of light and we need light to see things. Does the amount of light affect how well we can see objects? 2) To understand that light is reflected from surfaces. Which material is the most reflective and why? **3)** To know that light is generated by a light source. Can you identify sources of light? 4) To understand how shadows are formed. Which objects create the darkest shadows? **5)** To find patterns in the way that the size of shadows change. How does moving a light source affect the size and shape of a shadow? 6) To recognise that light from the sun can be dangerous and there are ways to protect their eyes. What is the best material for a pair of sunglasses that will protect your eyes from the sun?	• Light is needed in order to see and dark is the absence of light. • Some objects are light sources, for example the sun, light bulbs, candles. • Some surfaces reflect light. Reflection is easier off some surfaces than others. • Objects are easier to see when there is less light if they are reflective. • Light from the sun can be harmful to our eyes and skin but know how to protect ourselves. • Shadows are formed when an opaque or translucent object is between a light source and another surface. • The size of a shadow depends on the position of the source, object and surface.	**Asking and answering scientific questions** To use prior scientific knowledge to ask and answer their own scientific questions about the world around them: **Making Predictions** To make predictions and begin to give reasons based on what they know. **Setting up and carrying out tests** To discuss enquiry methods and describe a fair test. **Observing and measuring** **Identifying and classifying** To talk about criteria for grouping, sorting and categorising beginning to see patterns and relationships: **Recording and presenting data** To record findings using scientific language and present in note form, writing frames, diagrams, tables and charts.	light source, dark, absence of light, surface, shadow, reflect, mirror, dangerous, UV- light (revisit opaque, transparent, translucent, reflective and non-reflective from Y2 materials) fair testing, relationships, diagrams, chart, prediction, similarity, difference, findings, criteria, properties, characteristics, conclusion, explanation, reason, evaluate

Autumn 2	Animals, including humans	1) To identify food belonging to different food groups. What types of foods can we eat to get the right nutrients? **2)** To identify different types of nutrition in the ingredients of a meal. Can a pizza be a nutritious meal? **3)** To design a meal with the right amount of nutrients to keep us healthy. What nutrients are required to create a healthy meal? **4)** To explain how humans and some other animals need skeletons for support, protection and movement. Would humans be better off without bones? **5)** To explain how muscles help bones to move. How do our bodies move? **6)** To identify animals with and without skeletons and compare their movements. Do all animals have a skeleton?	• Plants make their own food but animals cannot. • Animals need to eat in order to get the nutrients they need to grow, be strong and healthy. • Food contains a range of nutrients that is needed by the body to stay healthy: carbohydrates including sugars, protein, vitamins, minerals, fats, sugars, water and fibre • Humans and some other animals have skeletons which help them to move and provide protection for vital organs and support the body • Skeletal muscles work in pairs to move bones by contracting (getting shorter) and relaxing (getting longer)	**Asking and answering scientific questions** To use prior scientific knowledge to ask and answer scientific questions. **Identifying and classifying** To talk about criteria for grouping, sorting and categorising, beginning to see patterns and relationships. **Recording and presenting data** To record their findings using scientific language and present in note form, writing frames, diagrams, tables and charts. **Concluding** To draw, with help, a simple conclusion based on evidence from observations.	nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine. fair testing, relationships, diagrams, chart, prediction, similarity, difference, evidence, information, findings, criteria, properties, characteristics, conclusion, explanation, reason, evaluate, improve

Spring 1	Rocks and Fossils	1) To compare and group different kinds of rocks on the basis of their appearance and simple physical properties. How could you group different types of rocks? 2) To name types of rock and give the physical features of each. What types of rock have similar properties? 3) To know what soils are made from. What is soil made up of? **4)** To understand how fossils are formed. How are fossils formed? 5) To understand that fossils may once have been living things trapped within rock. How did Mary Anning help us to understand more about fossils?	• Rocks have different sizes of grain or crystal. • Rocks can be hard or soft. • Rocks can come in different shapes and sizes – stones, pebbles and boulders. • Soil is made from ground down rocks and contains living and dead matter. • Fossils are formed after an animal dies, the soft parts of its body decompose leaving the hard parts behind. This becomes buried by small particles of rock.	**Asking and answering scientific questions** To use prior scientific knowledge to ask and answer scientific questions about the world around them. **Setting up and carrying out tests** To discuss enquiry methods and describe a fair test. **Identifying and classifying** To talk about criteria for grouping, sorting and categorising, beginning to see patterns and relationships.	rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, marble, chalk, granite, sandstone, slate, absorbs, water, fossil, bone, flesh, minerals fair testing, relationships, diagrams, chart, prediction, similarity, difference, evidence, information, findings, criteria, properties, characteristics, conclusion, explanation, reason, evaluate, improve

Spring 2 and Summer 1	Plants	1) To know the functions of different parts of a plant. What is the function of the flower, stem, leaves and root in a plant? 2) To explore the requirements of plants for life and growth. What do plants need to survive? 3) To identify what plants need in order to survive. What do plants need on order to survive 4) To explore how the requirements for life and growth vary from plant to plant. Do all plants need the same requirements to survive? 5) To understand the importance of leaves to a flowering plant. What is the importance of leaves to a flowering plant? 6) To explore the part that flowers play in the life cycle of flowering plants, including pollination and seed formation. What is the life cycle of a flowering plant? 7) To consolidate learning about the life cycle of flowering plants How do bees help the plant life cycle? 8) To explore the part that flowers play in the life cycle of flowering plants, including seed formation. How do plants disperse seeds? 9) To describe the life cycle of a flowering plant. What happens during each stage of a plant's life cycle? 10) To explore the importance of George Washington Carver's contributions to crop growth. How did George Washington Carver's work help improve crop rotation?	• Petals attract insects to the flower. • Stem provides structure and transports water and nutrients. • Leaves make food for the plants. • Roots absorb nutrients from the soil and anchor the plant. • Plants need light, water, air, nutrients and room to grow. • Leaves use sunlight for photosynthesis which produces food for the plant to grow. • Some plants produce flowers which enable the plant to reproduce. • Pollen is transferred from one flower to another (pollination) • Pollination forms seeds which are dispersed in different ways	**Asking and answering scientific questions** To use prior scientific knowledge to ask and answer questions about the world around them. **Making Predictions** To make predictions and begin to give reasons based on what they know. **Setting up and carrying out tests** To discuss how to set up a fair test. **Observing and measuring** **Identifying and classifying** **Recording and presenting data** To gather, record and use data in a variety of ways to answer a simple question. To record their findings using scientific language, diagrams, tables and charts e. **Concluding** **Analysing and evaluating**	photosynthesis, pollen., insect/ wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal), air, nutrients, minerals, soil, absorb, transport fair testing, relationships, diagrams, chart, prediction, similarity, difference, evidence, information, findings, criteria, properties, characteristics, conclusion, explanation, reason, evaluate, improve

Summer 2	Forces and Magnets	1) To compare how things move on different surfaces. Does the surface an object is travelling on affect its movement? 2) To predict how things will move on different surfaces. How do different surfaces affect the motion of a spinning top? 3) To notice that some forces do not need contact between two objects. Can magnets attract objects without touching them? 4) To describe magnets as having two poles. What happens when you place the ends of two magnets together? 5) To identify which materials are attracted to magnets. What materials are attracted to magnets? 6) To understand how to conduct a fair test. How could we test the strength of a magnet?	• Different surfaces have an effect on the speed of an object. • A force is a push or a pull. • Some pushes and pulls require a contact to move and some do not require contact. • Magnets have two poles (North and South) • Like poles repel (push away) and opposite poles attract (pull together). • Most metals are attracted to a magnet. • Not all metals are magnetic.	**Asking and answering scientific questions** **Making Predictions** To make predictions and begin to give reasons based on what they know. **Setting up and carrying out tests** To discuss enquiry methods and describe a fair test. **Observing and measuring** To take accurate measurements using a standard unit of measure. **Recording and presenting data** To record their findings using scientific language and diagrams. **Concluding** To draw with help, a simple conclusion based on evidence from an enquiry or observation. **Analysing and evaluating**	force, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole (revisit push and pull from Y2 materials topic) fair testing, relationships, diagrams, chart, prediction, similarity, difference, evidence, information, findings, criteria, properties, characteristics, conclusion, explanation, reason, evaluate, improve

Year 4					
Autumn 1	Electricity	1) To identify common appliances that run on electricity. Which appliances are electrical, and which one are non-electrical? 2) To identify the components needed in a simple series circuit and explain why you need each one. What components do you need in a circuit to light the bulb in a night light? (DT link). 3) To demonstrate that a switch opens and closes a circuit. How does the switch affect the flow of the electricity around the circuit? 4) To explain why a circuit must be closed in order for a light bulb to light up. Will my light bulb light up and why? 5) To sort materials into insulators and conductors. Which materials are conductors and which ones are insulators? 6) To investigate how insulators and conductors are useful in everyday life. Why are specific materials used to make the different components of a plug?	• A circuit needs a power source. • Electricity flows around a complete circuit to power components. • A switch opens and closes a circuit. • A switch can be added to the circuit to turn the component on or off. • Conductors are materials that allow electricity to flow through. • Metals are good conductors so can be used as wires in a circuit. • Insulators are materials that do not allow electricity to flow through.	**Asking and answering scientific questions** **To ask relevant scientific questions.** **Making Predictions** **To make predictions and begin to give reasons based on what they know about electrical circuits using scientific vocabulary.** **Setting up and carrying out tests** To make decisions about different enquiries, including recognising when a fair test is necessary and begin to identify variables. **Observing and measuring** To make careful and systematic observations. **Identifying and classifying** To identify similarities and differences when talking about electrical and non-electrical appliances. **Recording and presenting data** To choose appropriate ways to record and present information for different audiences. **Analysing and evaluating** *To use scientific evidence to support their findings.*	Electricity, electrical appliance, non-electrical appliance, battery, wires, component, circuit, bulb, cell, switch, complete circuit, incomplete circuit, conductor, insulator Findings, evidence, explanation, explain, predict, criteria, information

Autumn 2	Animals, including Humans	1) To identify the main parts of the digestive system. What are the main parts of the digestive system? 2) To identify and explain the simple functions each of the main parts of the digestive system plays in digestion. What are the main functions of the digestive system? 3) To identify the different types of teeth and their functions What is the purpose of each of the different types of teeth? 4) To compare the similarities and differences between the different types of teeth and explain why this is useful. Do we use the same teeth to eat all foods? 5) To identify predators, prey, producers and consumers. Which animals are producers and which ones are consumers? Which animals are predators and which ones are prey? 6) To construct food chains to show how energy flows from one organism to another. How does energy flow from one organism to another in a food chain?	• Food enters the digestive system through the mouth • Teeth are used to chew and break food into smaller pieces. Maintaining dental hygiene is crucial for oral health. • Food travels down the oesophagus to the stomach where it is churned. • Nutrients are absorbed in the small intestines and water is absorbed in the large intestines • Waste leaves the body through the anus. • There are different types of teeth which have different functions. Incisors cut and bite food. Canines rip and tear food. Premolars hold and crush food. Molars grind food. • Food chains show the flow of energy from one living thing to another. Each food chain starts with a producer (living thing that makes its own food) and a consumer (eats another living thing) • Predators eat other animals and prey are eaten by other animals.	**Asking and answering scientific questions** To ask relevant scientific questions and know that these can be answered through collecting scientific evidence, as well as through a range of secondary sources such as ICT. **Observing and measuring** To make systematic and careful observations. **Identifying and classifying** To use and begin to create simple keys. To identify similarities and differences between the different types of teeth. To identify the changes that occur as part of the digestive process. **Recording and presenting data** To choose appropriate ways to record and present information and findings.	mouth, tongue, teeth, oesophagus, stomach, small intestines, large intestines, anus, rectum, Canine, molar, pre-molar, incisor, carnivore, herbivore, omnivore, predator, prey, producer, consumer, energy, food chain information, diagram, explanation, similarities, differences, findings, predict, evidence.

Spring 1 / Spring 2	States of Matter	1) To know the characteristics of a solid, liquid and gas. What are the characteristics of a solid, a liquid and a gas? 2) To sort objects according to whether they are a solid, a liquid or a gas based on the key characteristics. What state of matter are each of these? 3) To explain the effect that a decrease in temperature has on different liquids. Do all liquids have the same freezing point? 4) To explain how an increase in temperature causes solids to melt and that different solids have different melting points. Do all solids have the same melting point? 5) To understand how temperature effects the time it takes for ice to melt. What impact does the temperature have on the time it takes for ice to melt? **6)** To apply knowledge of melting and freezing to understand the effects of climate change. How has global warming led to polar bears habitat being under threat? **7)** To explain the changes that occur during the process of evaporation and how this is linked to temperature. How does temperature effect how quickly socks dry? **8)** To explain the changes that occur during the process of condensation and how this is linked to temperature. Why is the glass of water wet on the outside? 9) To observe the part played by evaporation and condensation in the water cycle. What part do evaporation and condensation play within the water cycle?	• Solids keep their shape unless force is applied, liquids take the shape of the container and gases can spread out or be squashed to fit the room or the containers that they are in. • Solids and liquids keep their volume, but gases can change their volume. • Melting is a state change from solid to liquid. • Freezing is a state change from liquid to solid. • Condensation is a state change from a gas to a liquid. • Evaporation is a state change from liquid to gas. • Changes of state happen when the temperature increases or decreases. • The water cycle is a repeating cycle of processes in which water circulates between the Earth's oceans, land and atmosphere through a series of processes, including precipitation, transpiration, evaporation and condensation.	**Asking and answer scientific questions.** To ask scientific questions and know that these can be answered using evidence. **Make Predictions** To make predictions based on what they know, using simple scientific vocabulary. **Set up and carry out tests** To make decisions about different enquiries, including recognising when a fair test is necessary and begin to identify variables. **Observing and measuring** To make systematic and careful observations. To take accurate measurements using standard units and a range of equipment, including thermometers, data loggers and stopwatches. **Identifying and classifying** To identify similarities/ differences/ changes when talking about scientific processes. **Record and present data: Concluding** To use scientific evidence to support their findings. **Analysing and evaluating** Use recorded data to predict, pose new questions and suggest improvements for further enquiries.	state of matter, solid, liquid, gas, particles, heating, melting, melting point, freezing, freezing point, temperature, evaporation, heating, temperature, state change, liquid, gas, cooling, state change, boiling, condensation, water vapour, evaporation, temperature, precipitation, collection

Spring 2/ Summer 1	Living Things and Habitats	1) To group and classify animals in a variety of ways. How can I sort and classify these animals? 2) To use classification keys to group and identify a variety of animals. How can animals be classified using a classification key? 3) To create a classification key to sort animals based on their characteristics. How can these animals found on the grounds of Perlethorpe be classified using a classification key? 4) To create classification keys to group and identify trees in the local environment. How can I classify common British plants using a classification key? 5) To explain how humans can have a negative impact on the environment. How do humans have a negative impact on the environment? 6) To analyse the impact of the Exxon Valdez oil spill. How did the Exxon Valdez oils spill negatively impact wildlife on the Alaskan coastline? 7) To explain how humans can have a positive impact on the environment. How can I have a positive impact on the wildlife in my local area?	• Animals can be grouped based on their physical characteristics e.g. vertebrates and invertebrates); based on diet (e.g. herbivore, carnivore and omnivore). • Living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria and single celled organisms. • Classification keys use questions to sort and identify different living things. • As the climate changes and gets warmer, the habitats of animals' change which impacts on their future survival e.g. polar bears • Living things live in a habitat which provides a habitat they are suited to. These environments may change naturally e.g. through flooding, earthquakes and fire or through the actions of humans. • Humans can have a positive impact on the environment e.g. through setting up nature reserves or negative impact e.g. littering, pollution or oil spills.	**Asking and answering scientific questions** To ask relevant scientific questions and know that these can be answered through collecting scientific evidence, as well as through a range of secondary sources such as ICT. **Identifying and classifying** To identify similarities and differences when describing living things. To begin to create simple keys. **Recording and presenting data** To choose appropriate ways to record and present information, findings and conclusions for different audiences (e.g. displays, oral or written explanations).	classification, classification key, environment, habitat, climate change, human impact, positive, negative, migrate, hibernate, recap previous vocab taught in Y1 and 2, pollution

Summer 2	Sound	1) To explain how we hear sounds because of the vibrations they make. How is sound created? 2) To explain that vibrations from sound travel through a medium to the ear. How do we hear sound through a string telephone? 3) To recognise patterns between the pitch of a sound and the object. How can I make higher and lower pitch sounds on different musical instruments? 4) To identify patterns between the volume of the sound and the strength of the vibrations. How does the strength of the vibration affect the volume of a sound? 5) To recognise that sounds, get fainter as the distance between the sound source increases. How does the distance from the sound source effect the volume of the sound? 6) To use our knowledge of sound to understand the work of Alexander Graham Bell. How does sound travel through Alexander Graham Bell's telephone?	• Sound is produced from vibrations. • Vibrations travel through a medium from the source to our ears which allows us to hear the sound. • The loudness (volume) of the sound depends on the strength (size) of vibrations, • The pitch is affected by features of an object producing the sound, for example smaller objects usually produce higher pitched sounds. • Sounds get fainter the further away the sound source is because the distance between our ears and the sound is greater.	**Setting up and carrying out tests** To create comparative tests and ensure it is fair then begin to identify variables. To make decisions about different enquiries, including recognising when a fair test is necessary and begin to identify variables. **Observing and measuring** To observe carefully and systematically. To take accurate measurements using standard units and a range of equipment, including thermometers and data loggers. **Identifying and classifying** To identify patterns and changes related to scientific ideas. **Recording and presenting data** To choose appropriate ways to record and present information, findings and conclusions for different audiences (e.g. displays, oral or written explanations). **Concluding** To use scientific evidence to support their findings.	

Year 5					
Autumn 1	Forces	1) To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. Is there a relationship between the weight and the mass of an object? 2) To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. How can I use scientific equipment to learn about forces? 3) To identify the effects of friction on a moving object. What is the effect of friction when pulling an object across different surfaces? 4) To identify the effects of water resistance acting between moving surfaces. What is the effect of water resistance on how fast an object moves down different liquids? 5) To identify the effects of air resistance acting between moving surfaces. How does air resistance affect how quickly a parachute falls to the ground? 6) To recognise that some mechanisms, including levers, allow a smaller force to have a greater effect . How do leavers impact the amount of force needed to work a mechanism? 7) To recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. How can I use levers, pulleys and gears effectively in my design?	• A force causes an object to start moving, stop moving, speed up, slow down or change direction. • A force is measured in a unit called newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity. • Everything is pulled to the Earth by gravity. • Gravity causes unsupported objects to fall. • Air resistance, water resistance and friction are contact forces that act between moving surfaces. • A mechanism is a device that allows a small force to be increased to a larger force. Pulleys, levers and gears are all mechanisms also known as simple machines.	**Asking and answering scientific questions** To raise different scientific questions and hypotheses. **Making Predictions** To make predictions and begin to give reasons based on what they know using simple scientific vocabulary. **Setting up and carrying out tests** To plan a range of comparative and fair tests. **Observing and measuring** To plan and carry out comparative and fair tests, making systematic and careful observations. To take measurements using a range of scientific equipment (Newton meter) with increasing accuracy and precision. **Recording and presenting data** To record data and results of increasing complexity using a table and scientific diagrams. **Analysing and evaluating** To use a simple mode of communication to justify their conclusions on a hypothesis.	force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears

Autumn 2/ Spring 1	Properties and changes of materials	1) To know that everyday materials have different properties. How can materials be sorted according to their properties? 2) To know that some materials will dissolve in liquid to form a solution and to understand how to recover a substance from a solution. Which factors affect the speed at which sugar dissolves? How can we prove that dissolving sugar in water is a reversible change? 3) To know that can be separated using a variety of scientific methods. How can we separate a mixture of two or more materials? 4) To know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. 5) To use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. How can we separate a mixture of two or more materials? 6) To design and carry out an investigation to demonstrate thermal insulation. Which material is the most effective thermal insulator? 7) To give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials. 8) To know and be able to explain why materials are chosen for particular purposes, based on their properties. Why are materials chosen to make particular products? 9) To know that some changes such as burning wood, rusting and the action of acid on bicarbonate of soda, result in the formation of a new material and are irreversible changes. Are all changes to materials reversible?	• Materials have different uses depending on their properties and state (solid, liquid and gas). • Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. • Some materials are soluble in liquid and will dissolve to form a solution. • Some materials are insoluble and will not dissolve to form a solution. • Some changes to materials are reversible (can be changed back) such as dissolving, mixing and changes of state. • Some changes to materials create new materials and cannot be changed. This is known as irreversible change. • Materials that allow heat to pass through are thermal conductors and materials that do not allow heat to pass through are thermal insulators.	**Asking and answering scientific questions** To raise different types of scientific questions and hypotheses. **Setting up and carrying out tests** To plan comparative and fair tests. **Observing and measuring** To take measurements using a range of scientific equipment with increasing accuracy and precision. To plan and carry out a range of scientific enquiries, including comparative and fair tests, making systematic and careful observations **Recording and presenting data** To record data and results with increasing complexity using scientific diagrams, line graphs and tables. **Analysing and evaluating** To use relevant scientific language to discuss, communicate and justify scientific ideas.	thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material

Spring 2	Living Things and their Habitats	1) To describe the life cycle of a bird. What happens to a bird during its life cycle? 2) To describe the life cycle of a butterfly and a mammal. How are the life cycles of a butterfly and a mammal different? 3) To describe the similarities and differences in the life cycle of a mammals and a bird. 4) To describe the similarities and differences in the life cycle of a frog and a ladybird. Are all animal life cycles the same? 5) To understand that some plants are grown in different ways, including from bulbs. Are all plants grown in the same way? Why? 6) To describe the life process of reproduction in flowering plants. What happens at each stage of the life cycle of a flowering plant? 7) To describe how some plants reproduce. To describe the life cycle of a non-flowering plant. What are the advantages / disadvantages of sexual or asexual reproduction in plants? 8) To understand the benefits of growing plants from cuttings rather than growing from seeds. Why do most gardeners take cuttings, rather than growing mint from seed?	- As part of their life cycle, animals and plants reproduce. - Most animals reproduce sexually, where the sperm from the male fertilises the female egg. - Plants have male and female parts. The male part of the plant is called the stamen and the female part of a plant is the carpel. - Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. - Sexual reproduction occurs through pollination, usually involving wind or insects. - Mammals give birth to live young. - Some animals (e.g. chickens and snakes) lay eggs that hatch into live young Some young undergo a further change before becoming adults (e.g. caterpillars to butterflies), which is called metamorphosis.	**Observing and measuring** To carry out comparative tests, making systematic and careful observations. **Recording and presenting data** To record results of increasing complexity using scientific diagrams. **Analysing and evaluating** To use relevant scientific language and illustrations to discuss, justify and communicate ideas.	Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings

Summer 1	Animals, including humans	1) To know describe the changes as humans develop to old age. How do humans change throughout their life cycle? 2) To understand and analyse scientific data based on changes over time. Do baby boys and girls grow at the same rate? 3) To understand and describe the changes as humans develop to old age. How do humans change as they develop into old age?	• When babies are young they grow rapidly and as they develop they learn many skills • As we get older, our growth slows down. • Boys and girls' bodies begin to change as they go through puberty. • Puberty prepares our bodies for adulthood.	**Recording and presenting data** To record data of increasing complexity using a line graph. **Analysing and evaluating** To use a simple mode of communication to justify their conclusions on a hypothesis.	puberty, human, development, baby, toddler, child, teenager, adult, gestation, adolescent

Summer 2	Earth and Space	1) To be able to describe the movement of the Earth, relative to the sun in the solar system and know that the Sun, Earth and Moon are approximately spherical bodies. How are the Sun. the Earth and the Moon related to each other? 2) To know that there are eight planets in our solar system, that all travel around the sun in fixed orbits. Do all planets orbit at the same speed? 3) To use the idea of the Earth's rotation to explain why shadow are formed and change throughout the day. How does the Earth's rotation effect how shadows are formed and change throughout the day? 4) To use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. How does the Earth's rotation cause day and night? 5) To describe the movement of the moon relative to the earth. How is the movement of the moon related to the movement of the Earth? 6) To create an explanation text to summarise learning. What changes happen due to the movement of the Earth, the Moon, the Sun and the other planets?	• The sun is a star in the centre of our solar system. • There are 8 planets in our solar system, including planet Earth. • The 8 planets travel around the sun in fixed orbits. • Earth takes 365 ¼ days to orbit the sun. • The Earth rotates on its axis. As it rotates, half faces the sun (here it is day), and half faces away from the sun (here it is night). • It takes the moon about 28 days to orbit Earth. • The Earth, Sun and Moon are approximately spherical.	**Identifying and classifying** To begin to identify and explain patterns seen in the natural environment. **Concluding** To begin to recognise how scientific ideas change over time. **Analysing and evaluating** To use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas. To begin to recognise how scientific ideas change over time.	Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets.

Year 6					
Autumn 1	Light	1) To observe and explain how light travels. How does light travel? 2) To observe that light from sources can be reflected in different ways. How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface? 3) To identify how we can see an object that is not a light source. How can I see something that is not a light source? 4) To compare how reflective different materials are. Which material is the most reflective? 5) To observe that shadows have the same shape as the objects that cast them. How does the shape of an object affect the shape of a shadow? 6) To investigate how the size of shadows can change. How can the shadow of an object be changed?	• Light travels from a light source in straight lines. • We see things because light hits an object and is then reflected from the object's surface to our eyes. We cannot see anything without light. (Recap from Y3). • Where there is an opaque or translucent object in front of a light source it will block some of the light and cause a shadow to be formed behind it. As light travels in straight lines the shadow will be the same shape as the object blocking the light. • Translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object.; this means that a something seen through a translucent object is not clearly defined. • White light is made up from many different colours of light and these can be seen if we split the light using water or a glass prism. We see this in a rainbow. This is called refraction of light to make a spectrum. • Light can be reflected off any surface and is easiest to reflect off shiny surfaces. You can bounce light easily off mirrors, which is how periscopes work.	**Asking and answering scientific questions** **Making Predictions** **Setting up and carrying out tests** To select and plan the most suitable line of enquiry explaining which variables need to be controlled and why in a variety of comparative and fair tests. **Observing and measuring** To make their own decisions about what observations to make. **Identifying and classifying** **Recording and presenting data** To record findings within a table. Record data and results using increasing complexity using scientific diagrams and labels (tables, bar and line graphs). **Concluding** To identify validity of conclusion and required improvement to methodology. **Analysing and evaluating** To use relevant scientific language and illustrations to discuss, communicate and justify their ideas.	straight lines, light rays.

Autumn 2	Electricity	1) To describe how scientists have influenced electricity in our world today. How have scientists influenced electricity in world today? 2) To recognise and use circuit symbols. What are circuit symbols and why are they used? 3) To predict if circuits will or will not work giving reasons for my views. How can I identify if a circuit will work or not? 4) To plan and conduct a scientific investigation How does the number of cells affect the brightness of bulbs? 5) To investigate how the number of bulbs in a circuit affects their brightness. How does the number of bulbs effect their brightness? 6) To explain how a circuit operates to achieve operations. Does the position of the switch affect the effectiveness of the circuit?	• Voltage is a measure of the power of a cell to produce electricity; it is a measure of the 'push' of electric current, not the size of the electric current • As the number and voltage of cells in a circuit increases, the brightness of a bulb, the speed of a motor spinning or the volume of a buzzer will increase. • Turning the switch off breaks, opening up the circuit so the circuit is incomplete, and electricity cannot flow, meaning components such as bulbs, motors and buzzers will no longer work. • Two bulbs in a circuit can be wired to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other bulb will not continue to shine as the circuit is broken, but if one bulb blows in a parallel circuit there will still be a complete circuit for the other bulb so it will continue to shine. • Recognised symbols are used within circuit diagrams.	**Making Predictions** To make predictions and to give reasons base on what we know using simple scientific vocabulary. **Setting up and carrying out tests** To select and plan the most suitable line of enquiry explaining which variables need to be controlled and why in a variety of comparative and fair tests. **Recording and presenting data** To choose the most effective approach to record and report results. **Concluding** To discuss how scientific ideas develop over time. **Analysing and evaluating** To identify scientific evidence that has been used to support and refute ideas or arguments.	Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage, volts.

Spring 1	Living Things and their Habitats	1) To describe how living things are classified into broad group according to common observable characteristics. Who is Carl Linneas and how has his work impacted how we classify living things today? 2) To sort animals into groups according to common observable characteristics. How can branching diagrams help us to group animals according to their features? 3) To identify the common observable characteristics of different groups of plants. How can plants be classified according to their features? 4) To identify helpful and harmful microorganisms and their properties. Are all microorganisms harmful? 5) To use and devise classification for living things, giving reasons for why animals and plants belong in particular groups based on specific characteristics. What animals have been unclassifiable to biologists? 6) To identify characteristics of vertebrate and invertebrate groups. What classification group is your animal in and why?	• Living things can be formally grouped into kingdoms according to characteristics. • Plants and animals are two main groups but there are other living things that do not fit into these groups (e.g. micro-organisms such as bacteria and yeast and toadstools and mushrooms). • Animals can be divided into two main groups (vertebrates and invertebrates). Vertebrates can be divided into five small groups- fish, amphibians, reptiles, birds and mammals. Invertebrates can be divided into a number of groups including insects, spiders, snails and worms. (is this accurate?) • Plants can be divided into flowering and non-flowering plants. • Microorganisms are living things that cannot be seen by the naked eye; they can only be seen under a microscope. • Bacteria, viruses and fungi are groups of micro-organisms; some microorganisms are helpful but some are harmful. • Plants can be divided broadly into two main groups: flowering plants and non-flowering plants.	**Asking and answering scientific questions** To pose/select the most appropriate line of enquiry to investigate scientific questions. **Making Predictions** To make predictions and to give reasons based on what they know using simple scientific vocabulary. **Setting up and carrying out tests** **Observing and measuring** To make their own decisions about which observations to make. To decide how long to take to take measurements for. **Identifying and classifying** To use and develop keys to identify, classify and describe living things. To identify and explain patterns seen in the natural environment. **Recording and presenting data** To choose the most effective approach to record and report results linking to mathematical knowledge. **Concluding** To identify validity of conclusion and required improvement to methodology.	vertebrates, fish, amphibians, reptiles, birds, mammals, warm-blooded, cold-blooded, invertebrates, insects, spiders, snails, worms, flowering, non-flowering, mosses, ferns, conifers, micro-organisms.

Spring 2	Evolution and Inheritance	1) To explain how characteristics are passed from parents to their offspring. *(inheritance).* Why do family members look similar but not identical? **2)** To describe how plants and animals are adapted to their environment. How are different animals and plants adapted to their environment? 3) To identify how animals are adapted to their environment and that adaptation may lead to evolution. Why are there so many different species of birds? 4) To use models within an investigation to demonstrate evolution. Which birds' beak is best for collecting different types of food? 5) To identify and compare the key ideas of Charles Darwin and Alfred Wallace's theories of evolution. What can scientists tell us about how animals have evolved over time? 6) To compare fossils to modern animals. What can fossils tell us about the past?	• All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Offspring are not identical to their parents and vary from each other. • Plants and animals have characteristics that make them suited (adapted) to their environments. They have adapted to suit changes in the environments and habitats they live in. Animals and plants that don't adapt to their habitat die out – this is called 'survival of the fittest'. • If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics onto their young. Over time, these become more dominant within the population. New species are sometimes created. This is called evolution. • Charles Darwin developed the theory of evolution by observing how living things adapted to the environment to become distinct varieties with their own characteristics. • Fossils give us evidence of what lived on the Earth millions of years ago and provide evidence to support the theory of evolution.	**Making Predictions** To make predictions based on what they know using scientific vocabulary. **Identifying and classifying** To identify and explain patterns seen in the natural environment. **Recording and presenting data** **Concluding** To identify validity of conclusion and required improvement to methodology. **Analysing and evaluating** To identify scientific evidence that supports or refutes their findings.	offspring, sexual reproduction, vary, characteristics, adapted, inherited, species, evolve, evolution

Summer 1 and 2	Animals, including Humans	1) To identify and name the main parts of the human circulatory system. Which organs form the circulatory system and what are their functions? 2) To describe and explain the functions of the heart, blood vessels and blood. What is the circulatory system and how does it work? 3) To explain the workings of the circulatory system. What is the circulatory system and how does it work? 4) To investigate how exercise affects our pulse rate. How does exercise affect our pulse rate? 5) To interpret results showing how exercise affects pulse rate. How does my pulse rate after exercise compare to others? 6) To describe how nutrients and water are transported within animals, including humans. How do our bodies transport water and nutrients? 7) To recognise the impact of diet, exercise, drugs and lifestyle on the way the human body functions. How can I keep my body and heart healthy?	• The heart acts as a pump and pushes blood around the body. Oxygen goes into the blood and carbon dioxide is removed. Blood vessels carry the blood; arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins. • Blood transports oxygen, nutrients and water to all cells in the body. • Once oxygen has been removed from the blood, carbon dioxide is carried by the blood back to the heart and the cycle starts again as it is transported to the lungs to be removed from the body. This is the human circulatory system. • Smoking, taking drugs and drinking alcohol can have a detrimental effect on the heart and the rest of our body. • Maintaining a healthy diet can keep your heart healthy. An unhealthy diet can impact the way our body functions. • Exercise is important to keep the heart healthy. When we exercise, our hearts beat more frequently so that the oxygen that is used up can be replenished, Fitter people tend to have lower heart rates. • Diet, exercise, drugs and lifestyle have an impact on our bodies. They can effect how well our hearts work, how likely we are to suffer from conditions, such as diabetes, how clearly we think, and generally how fit and well we feel.	**Asking and answering scientific questions** **Making Predictions** To make predictions and to give reasons based on what they know using simple scientific vocabulary. **Setting up and carrying out tests** To select and plan the most suitable line of enquiry, explaining which variables need to be controlled and why. **Observing and measuring** To make their own decisions about which observations to make. To choose the most appropriate equipment in order to take measurements. To decide how long to take to take measurements for. **Identifying and classifying** **Recording and presenting data** To choose the most effective approach to record and report results, linking to mathematical knowledge. **Concluding** To discuss how scientific ideas develop over time. To identify validity of conclusion and required improvement to methodology.	heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, cycle, circulatory system, diet, drugs, lifestyle, veins, arteries, oxygenated and deoxygenated blood.

Diversity in our science curriculum

Year 1

Year 1 study a diverse range of scientists from the past and the present day with different backgrounds, including Pearl Agyakwa, Linda Brown Buck, June Bacon-Bercey and Angie Burnett.

Year 2

Year 2 study a diverse range of scientists from the past and the present day with different backgrounds, including Dr Aarti Sehdev, Tanesha Allen, Charles Macintosh and Jemma Dias.

Year 3

Year 3 study a diverse range of scientists from the past and the present day with different backgrounds, including Mary Anning, George Washington Carver and Percy Shaw.

Year 4

Year 4 study a diverse range of scientists from the past and the present day with different backgrounds, including Stephen Gray, Sau Lan Wu and the research team on the RRS Sir David Attenborough. The children also learn about Alexander Graham Bell and his work with children with hearing impairments.

Year 5

Year 5 study a diverse range of scientists from the past and the present day with different backgrounds, including Jane Goodall, Leonardo DaVinci, and Professor Brian Cox.

Year 6

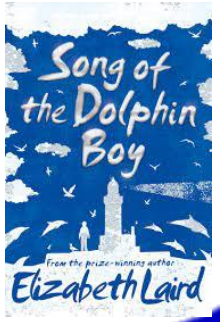
Year 6 study a diverse range of scientists from the past and the present day with different backgrounds, including Ibn-al-Haytham, Nikola Tesla, Agnus Arber, Santorio Santorio and Ruth Ella Moore.

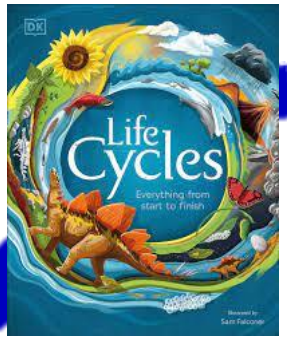
Local links

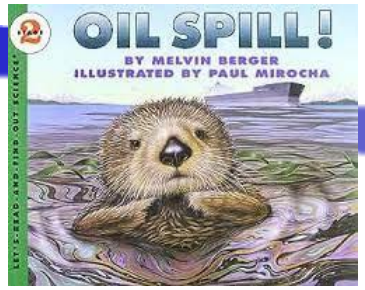
				 	
Year 1 **Year 1 visit the walled Kitchen Garden at Clumber Park to learn about flowers and trees.**	**Year 2** **Year 2 visit Matlock Farm Park as part of their Animals, including Humans topic.**	**Year 3**	**Year 4** **Year 4 take part in a residential visit to Perlethorpe, where pupils experience a nighttime walk using scientific equipment to detect bats; white deer may be seen too.**	**Year 5** **Year 5 visit the National Space Centre and Little Roots Allotment.**	**Year 6** **Smashing stereotypes – Year 6 visit Clumber Park to learn about science and green sector jobs (National Trust)**

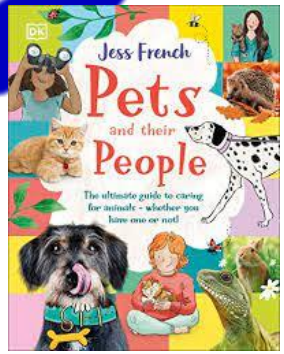
Reading at the heart of the science curriculum

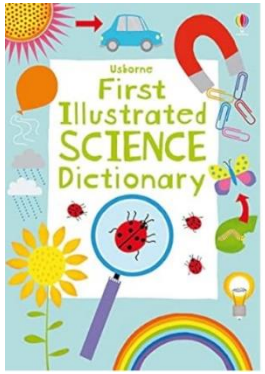
We read these texts across the key stages. We have access to other books too in our classrooms to develop our knowledge of science.

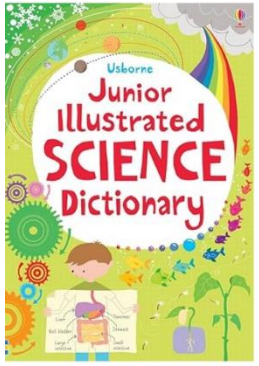


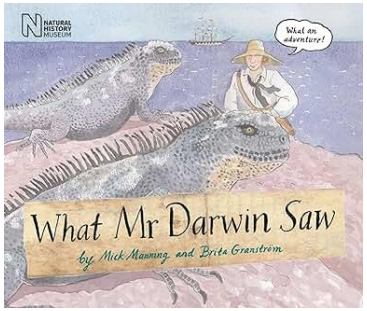


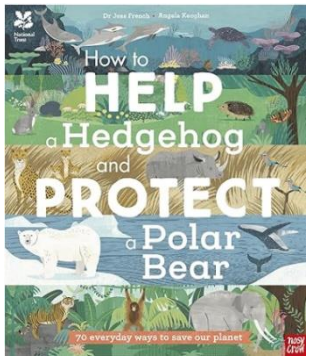












End of key stage expectations

By the end of EYFS children will… Have experienced science with Early Years practitioners beginning with each child exploring the school and the local area, where possible. Pupils will have experienced school to be a rich place because science is everywhere, all the time, because it is about materials, living things and physical processes. Pupils will be exposed to simple scientific vocabulary promoted through the Early Years curriculum with practitioners enriching the environment to develop oracy, questioning and curious minds.
By the end of Key Stage 1 children will… Have followed the Key Stage One national curriculum framework, where pupils learn about materials, their senses, changes and life cycles, and plants and how they grow. Observation is a key skill and exploration – indoors and outdoors - an important part of becoming a scientist. Key Stage 1 pupils will have experienced and observed phenomena, looking closely at the natural and humanely constructed world around them. Building key knowledge (facts), being curious and asking questions will help develop towards an understanding of scientific ideas by using different types of scientific enquiry to answer questions. Using simple scientific language pupils will talk about what they have found out and communicate their ideas.
By the end of Lower Key Stage 2 children will… Have followed the Key Stage Two national curriculum framework for years 3 and 4 where they will have broadened their scientific view of the world around them. This will be through exploring, talking about, testing, and developing ideas about everyday phenomena and the relationships between living things and familiar environments. Pupils will be asking questions and making decisions about how they will answer them, including observing changes, recognising patterns, comparing, grouping, classifying, and using secondary sources of information for finding information. Pupils will be drawing simple conclusions based on the evidence they have collected. By the end of Upper Key Stage 2 children will… Have followed the Key Stage Two national curriculum framework for years 5 and 6, where they have developed ways of working in a scientific manner, whilst fostering a genuine curiosity and interest in the world around them, and have developed skills around observation and measurements, recording data and presenting findings. They will have developed a deeper understanding of a wide range of scientific ideas through exploring and talking about their ideas, asking questions about scientific phenomena, analysing functions, relationships, and interactions more systematically. Over time scientific ideas may change; pupils will begin to recognise and understand this. Pupils will work and think scientifically having developed a rich body of knowledge about the world around them. Pupils will have explored things around plants and habitats, and humans in the biology curriculum. They'll have explored sound, electricity, and forces in the physics curriculum. They'll have a good understanding of states of matter and how they change within the chemistry curriculum. In primary school, over time, pupils will have been constantly challenged to develop scientific skills, alongside developing a rich body of knowledge.