

The Science Curriculum at Brownlow Fold



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Purpose of Study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

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

Strategic Focus: Prioritising Foundational Knowledge, Basic Skills, and the Bottom 20% in Reading

Foundational Knowledge

Our curriculum is built on the principle that secure foundational knowledge underpins all future learning. In the primary phase, this means giving children repeated opportunities to acquire, revisit, and apply core concepts across English and the wider curriculum. We sequence learning so that pupils develop strong recall and understanding of essential subject knowledge, ensuring that no child is left behind in the building blocks of literacy.

Basic Skills

The teaching of basic skills particularly early reading, phonics, vocabulary development, spelling, and handwriting is a non-negotiable priority. We recognise that fluency in these skills is essential to accessing the broader curriculum. High expectations, consistent routines, and carefully structured practice ensure that pupils not only acquire these skills but also gain confidence in using them independently and across subjects.

Addressing the Needs of the Bottom 20% in Reading

We place a particular emphasis on supporting the lowest 20% of readers, ensuring early identification, targeted intervention, and bespoke support. This includes:

- Systematic use of assessment to monitor progress and highlight gaps.
- Structured interventions (including additional phonics, precision teaching, and guided reading).
- Deployment of skilled adults to provide intensive, high-quality support.

- Building motivation and fostering positive attitudes to reading by providing texts that are both accessible and engaging.

Equity and Excellence

Our strategy reflects a moral and professional commitment to equity. We know that reading is the gateway to the curriculum, and we are determined to close the gap for vulnerable learners. By prioritising foundational knowledge, embedding basic skills, and investing in the progress of the bottom 20% of readers, we ensure that every child leaves primary education equipped for the next stage of learning.

Curriculum Design/Science Key Teaching Methodology/Strategies

Our Science curriculum has been carefully designed so that pupils gain more knowledge over time. Some knowledge is very important, and we return to this regularly to help it 'stick' in pupils' memory. Knowledge learned across the wider curriculum facilitates comprehension. It also helps our pupils gain a broader vocabulary. We know that children are exposed to a richer **vocabulary** base when they access a broad curriculum, and this is very important to their future success.

We have differentiated between three tiers of language:

- **Tier 1 vocabulary:** Everyday words, which might need to be taught explicitly, such as 'good', 'child' or 'Sunday'.
- **Tier 2 vocabulary:** Words which appear across the curriculum but less commonly in everyday speech, such as 'examine', 'deceive' or 'forthright'.
- **Tier 3 vocabulary:** Words which are specific to a subject: for example, in science, pupils need to grasp the scientific meaning of terms such as 'evaporation.'

In our curriculum plans we have outlined the specific vocabulary children need to know, use and remember at each stage in their learning. In designing our Science curriculum, teachers and learners use a **prime learning challenge**, expressed as a question, as the starting point. In Science this ensures that key scientific concepts are explored and developed within a framework of practical and collaborative science enquiry lessons. Using the information gained from **pre-learning tasks** and our school context, a series of **subsidiary questions** are then asked. **Pre-learning** tasks ensure that our pupils are given the opportunity to share what they think they already know about a particular topic. Well-planned pre-learning tasks inform teachers of any misconceptions pupils may have. Teachers introduce the ambitious end goal/outcome of the lesson/unit, making explicit how the small step fits into the wider learning journey. **Knowledge components** are shared, which ensures pupils know how they will achieve their outcome by the end of the lesson. Subject specific enrichment opportunities are provided both inside and outside of school such as visits to the Science and Technology Centre or experiments. Teachers develop pupils' disciplinary knowledge of thinking, investigating and communicating like a scientist.

We know that knowledge 'sticks' when links are made between subjects. Webs of knowledge are created in our memories (schema) when we create meaningful links between learning. The more we introduce pupils to related content, the deeper knowledge will be. **Key concepts/knowledge** in each subject are revisited over time. We use the ten evidence-based Principles of Direct Instruction (Rosenshine) to build schema through carefully sequenced **component tasks** leading to **composite tasks**. Teachers model and develop key knowledge using the "I do, we do, you do" pedagogical structure. Teachers check **key knowledge** has been retained to the working memory at the end of every lesson, through the use of key questioning. Each unit enables teachers to model and explicitly teach the relevant mathematical requirements to enhance the pupils scientific understanding and enquiry. **Retrieval practice** provides opportunities for pupils to practise applying the knowledge they have understood to consolidate understanding and strengthen recall.

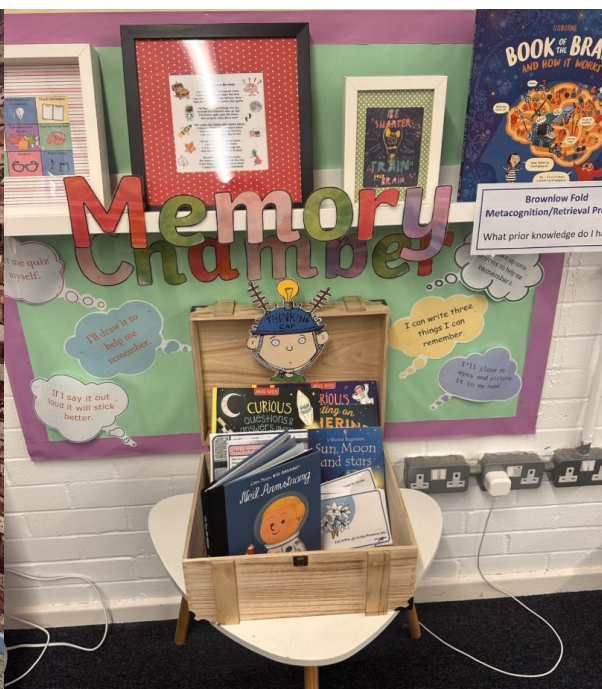
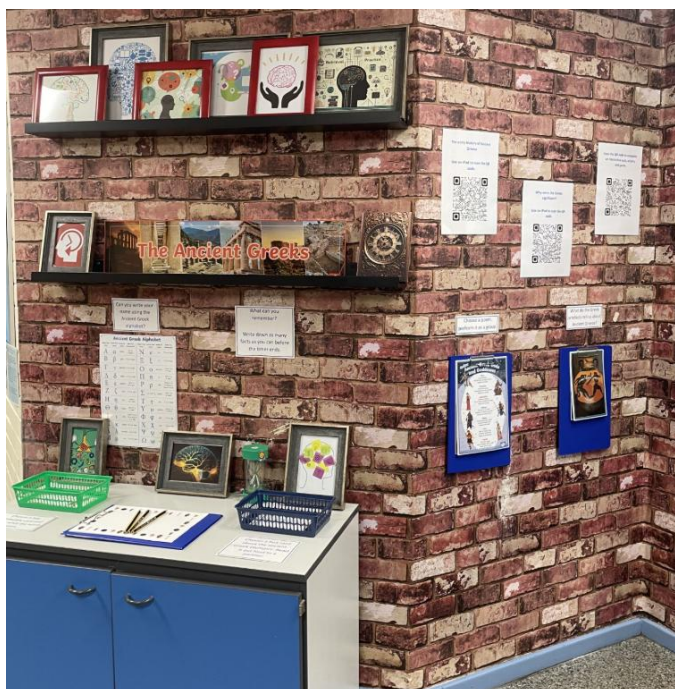
Retrieval Alley

To support the retrieval practice activities, we have created a **Retrieval Alley** in school. This corridor serves as a real-life memory chamber for the children bringing all of the **key learning** to the fore front of children's minds. Each half term one year group fills the chamber with essential knowledge in an interactive way. Classes whose year group is not the focus on the main corridor also create a mini chamber/display in their classroom

Autumn One – Year Four Memory Chamber
Autumn Two - Year Five Memory Chamber

Spring One - Year Six Memory Chamber
Spring Two - Year Three Memory Chamber

Summer One - Year Two Memory Chamber
Summer Two - Year One Memory Chamber



Within each unit of work, we include a **Green for Growth post learning check**. This task is designed to enable pupils to showcase all the knowledge they have acquired and demonstrate their depth of understanding. **The Key Knowledge for each unit is highlighted in bold, retrieved and then applied to future learning across the curriculum**. Each unit of work is also enhanced by a unit specific **knowledge organiser** which highlights the key knowledge for that particular unit of work.

Each class has a 'Key Knowledge Box' which serves as a structured repository of essential learning, clearly outlining the core knowledge that every child is expected to retain by the end of their year group. By encapsulating key facts, concepts, and vocabulary, the knowledge boxes ensure that there is a clear understanding of the foundational learning for each subject area, strengthening long-term retention and curriculum continuity throughout the school.

Brownlow Fold Primary School

Congratulations



Knowledge is power.
Travel back to bring it forward.

You are a Brownlow Fold **Time Traveller** of the Week because you successfully discussed your previous learning, consolidated your understanding and strengthened your recall.

Link	Learn	Know	Retrieve	Apply



Brownlow Time Traveller

To strengthen retrieval practice across the curriculum each class awards a 'Time Traveller of the Week' certificate. Pupils revisit prior learning (travelling back in time).

Teachers look for children who:

- Deliberately connect current lessons to previous units
- Recall key facts, vocabulary and methods with increasing accuracy
- Explain how their prior knowledge helped them today
- Show effort and a positive attitude during retrieval activities

Oracy

At Brownlow Fold, we view **oracy** as a fundamental skill that underpins learning, social development, and future success. Through deliberate teaching across all subjects, pupils are supported to develop strong speaking and listening skills, use vocabulary and grammar accurately, and communicate with clarity and respect. Oracy at Brownlow Fold not only supports academic achievement, critical thinking, and deeper understanding, but also builds confidence, empathy, and positive relationships. By providing language-rich experiences, we help close attainment gaps, ensuring every child has the opportunity to thrive in school and beyond.

In **Science**, our aim is to nurture independence, curiosity, and a deep understanding of the world through high-quality Science teaching. W Our teaching encourages pupils to build resilience in their learning.

At Brownlow Fold, we believe that **Science** should be more than simply learning place names or geographical facts — it should be about developing children as critical, reflective thinkers, further supporting our whole-school focus on **Oracy**. Asking children to “prove it” by explaining their reasoning, or responding to prompts such as “How do you know?” and “Can you explain?” is a powerful teaching strategy that supports this vision. This approach shifts the focus from fact-recall to **deeper thinking, reasoning, and scientific understanding**. It encourages children to make sense of the world around them, articulate their understanding of processes and patterns, and fully engage in the process of **scientific enquiry** rather than just memorising content. By embedding purposeful questioning into our science teaching, we:

- **Develop critical thinking skills** – enabling children to analyse data, weigh up evidence, identify patterns, and make informed decisions.
- **Deepen scientific understanding** – ensuring pupils understand the causes, interactions, and consequences of physical and human processes, not just what or where something is.
- **Promote scientific talk** – helping learners use and apply accurate scientific vocabulary when discussing results and analysing their findings.
- **Support formative assessment** – giving teacher’s valuable insight into pupils’ understanding, misconceptions, and developing geographical thinking.

TALK LIKE A ... SCIENTIST



NOTICE SOMETHING

I have noticed ...

I have observed ...

? QUESTION IT

I wonder why ... ?

I wonder what would happen if ... ?

I want to find out ...



MAKE A PREDICTION

I think ... because ...

I predict ... because ...

Using what I know, I think ...



GET PLANNING

The one thing I will change will be ...

The things I will keep the same are ...

We will be observing ...

We will be measuring ...

The best way to record this is ...



GATHER THE DATA

I have already noticed ...

What I am seeing so far is ...



DRAW A CONCLUSION

Looking at the results, I can see ...

The results show that my prediction is correct because ...

The results show that my prediction is incorrect, because ...

Knowing more and remembering more

All teachers follow this approach which supports the consolidation of prior knowledge and the incremental development of new knowledge. Brownlow is Brilliant (whole school PP) is shared daily with children and is an opportunity for the children to retrieve key learning. Timetabled retrieval lessons also focus on retrieving learning from the previous term. School have purchased LBQ questions which are low stakes quizzes which assess the children's knowledge of the key curriculum content. Pupils use ipads to answer questions and progressing at their own pace. Teachers gain immediate feedback and live analysis that supports assessment and future planning.

Retrieval curriculum conversations also take place in mixed year groups with a subject focus once every half term. This provides opportunities for pupils discuss their learning, from previous year groups, learn about future learning, consolidate their understanding and strengthen their recall.

Link	Learn	Know	Retrieve	Apply
				
Focus on prior knowledge through pre learning questions - Within the same subject - Within another subject - From personal experience	Use the prime learning challenge, expressed as a question. Use the information gained from pre-learning tasks and our school context, to answer the subsidiary questions	Use the Knowledge Organisers and the Green for Growth Check	Link ideas to existing knowledge and organise into mental models/schemata	Apply knowledge to future learning

Teaching and Learning Pedagogy

Principles of Direct Instruction and White Rose

At Brownlow Fold, our science teaching is underpinned by the Principles of Direct Instruction, including clear modelling of scientific concepts and enquiry skills, guided practice, frequent checking for understanding, and carefully scaffolded support. Our science curriculum is structured to ensure consistency in teaching approach across the school, enabling all pupils to develop secure scientific knowledge and skills over time.

<u>Review:</u>	<u>Modelling & Explanations:</u>	<u>Guided Practice:</u>	<u>Checking for Understanding:</u>	<u>Independent Practice:</u>
Each lesson contains a short review of previous learning to strengthen connections and recall.	Models and worked examples are provided to demonstrate learning in action (I DO)	Practice is guided by the teacher as pupils begin to practice new learning. Teachers offer support and prompts (WE DO)	The teachers continuously check for understanding by asking questions and giving feedback.	The teacher monitors independent practice, ensuring learning become automatic (YOU DO)

				
<u>Small Steps:</u> New material, such as a calculation method, is presented in small steps with opportunities to practise, reducing cognitive overload. 	<u>Questioning:</u> Children are asked lots of questions and responses checked for pupil understanding. 	<u>Scaffolding:</u> The teacher provides support and scaffolds for difficult tasks which are gradually removed. 	<u>High Success Rate:</u> Aim for a high success rate during instruction to build confidence and to promote motivation. 	<u>Review:</u> The teacher facilitates daily, weekly and monthly retrieval practice to strengthen knowledge and promote automatic recall. 

At Brownlow Fold, our approach to teaching is built on **clarity, structure, and high expectations for every learner**. Our science curriculum reflects this approach and aligns closely with **Rosenshine's Principles of Direct Instruction**, supporting equity and excellence for all pupils, including those who find science more challenging.

Lessons begin with **retrieval practice** to activate prior scientific knowledge and identify misconceptions before new learning is introduced. New scientific concepts and enquiry skills are presented in **small, carefully sequenced steps**, with teachers providing clear modelling and explanations. This includes modelling scientific vocabulary, processes, and investigative methods, ensuring pupils understand both the knowledge and the “working scientifically” skills required.

Pupils move from **guided practice**, such as shared investigations or supported data collection, to **independent application**, where they apply learning through practical work, recording results, and drawing conclusions. Learning is supported through appropriate **scaffolding, ongoing assessment, and immediate feedback**, ensuring understanding is secure, confidence is built, and a **high success rate** is maintained.

Scientific knowledge and skills are revisited through **systematic retrieval** across lessons, units, and terms, strengthening retention and supporting long-term understanding. This structured, research-informed approach underpins our belief that **all pupils can succeed in science** when teaching is explicit, responsive, and appropriately challenging.

Rosenshine's Principles in Science

- Science teaching is explicit, structured, and cumulative.
- Prior scientific knowledge and vocabulary are reviewed at the start of lessons.
- New learning is introduced through clear modelling and explanation of concepts and enquiry skills.
- Content and investigations are broken into small steps to reduce cognitive load.
- Guided practice supports pupils during investigations and skill development.
- Understanding is checked continuously through questioning and formative assessment.
- Independent practice develops confidence in applying scientific knowledge and skills.
- Scaffolds support access and are gradually withdrawn to promote independence.
- Lessons are designed to ensure high levels of success for all pupils.
- Retrieval practice is embedded regularly to secure long-term scientific understanding

Adaptive Teaching

Adapting the curriculum for pupils with SEND in Science including the SEND Learning Environment Checklist

At Brownlow we provide opportunity for all pupils to experience success by:

- Adapting lessons, whilst maintaining high expectations for all, so that all pupils have the opportunity to meet expectations.
- Balancing input of new content so that pupils master important concepts.
- Making effective use of learning support staff.
- Achieving external validation to quality assure provision – DAQM achieved November 2024 and BPTAA achieved in July 2025

All pupils access the same curriculum and are given scaffolds to support. This approach supports high achievement for everyone and raises aspirations for all pupils. Listed below are some of the strategies that a teacher may implement to support children dependent on the area of need. Teachers will also make in-the-moment adaptations such as changing their language, clarifying a task or re-explaining a concept or explaining it in a different way etc.

SEND Science Curriculum Adaptations

The accessibility of science demonstrations is considered.

The demonstration area is planned so that it is clearly laid out, uncluttered and gives all pupils a clear view.

Seating allows all pupils in the class to communicate respond and interact with each other and the teacher in discussions.

Pupils are well prepared for trips/visits, particularly to museums. Preparation can include but is not limited to photographs, videos etc. so that pupils are not worried about unfamiliar situations.

ICT is sometimes used to make science lessons more accessible for all pupils.

Risk points in lessons are considered, e.g. for pupils with noise or smell sensitivity.

We recognise that the language of science may be challenging for many pupils.

Investigations are built on by using careful discussions that help pupils understand and use scientific vocabulary and help them to analyse and understand what they have observed.

In a plenary after the class has completed an investigation, pupils are given time to discuss the answers to questions in pairs, before giving verbal responses.

Pupils' understanding is regularly checked by inviting them to reformulate explanations in their own words or in other ways.

Photographs are taken to capture each stage of an investigation, or important findings, for future reference.

Photographs are also be used to build a visual record.

Adapting the curriculum for pupils who are more able in Science

Key teaching strategies used to support provision for more able pupils:

- Task design: Teachers ensure the right pitch with appropriate challenge to engage pupils, i.e. tasks make them think, not merely do.
- Cutaway: Teachers determine if 'more able' pupils need all of the direct instruction for part of every lesson i.e. they may start the work earlier than the rest of the class.
- Adaptations: task, outcome, resources, how the pupils are grouped etc.
- Ongoing dialogue: Metacognitive approaches are used encouraging the children to reflect on their learning and make decisions
- Applying learning: Time to apply learning in a different context or extend learning, going sideways rather than always upwards.
- Working with others: Pair and group work.
- Beyond the classroom: Opportunities sought beyond the classroom

Subject Content

Nursery

Communication and Language:

- Understand 'why' questions, like: "Why do you think the caterpillar got so fat?"

Personal, Social and Emotional Development:

- Make healthy choices about food, drink, activity and tooth brushing.

Understanding the World:

- 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.
- Explore how things work
- 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.

EYFS

Reception

Communication and Language

Learn new vocabulary

Ask questions to find out more and to check what has been said to them.

Articulate their ideas and thoughts in well-formed sentences.

Describe events in some detail.

Use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen.

Use new vocabulary in different contexts.

Personal, Social and Emotional Development

Know and talk about the different factors that support their overall health and wellbeing:

- regular physical activity
- healthy eating
- tooth brushing
- sensible amounts of 'screen time'
- having a good sleep routine
- being a safe pedestrian

Understanding the World

Explore the natural world around them.

Describe what they see, hear and feel while they are outside.

Recognise some environments that are different to the one in which they live.

Understand the effect of changing seasons on the natural world around them.

ELG

Communication and Language

Listening, Attention and Understanding

Make comments about what they have heard and ask questions to clarify their understanding.

Personal, Social and Emotional Development

Managing Self

Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.

Understanding the World

The Natural World

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.

Key Stage One

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 One

Plants

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

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

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

observe changes across the 4 seasons

observe and describe weather associated with the seasons and how day length varies

Year 2

Living things and their habitats

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

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

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

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

Key Stage Two

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

Plants

- 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

- 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

- 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

- 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

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

Living things and their habitats

- 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

- describe the changes as humans develop to old age

Properties and changes of materials

- 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

- 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

- 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

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

Living things and their habitats

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

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

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

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

identify common appliances that run on electricity
construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
recognise some common conductors and insulators, and associate metals with being good conductors

Year 6

Living things and their habitats

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

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

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

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

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

Key Stage Three

The principal focus of science teaching in key stage 3 is to develop a deeper understanding of a range of scientific ideas in the subject disciplines of biology, chemistry and physics. Pupils should begin to see the connections between these subject areas and become aware of some of the big ideas underpinning scientific knowledge and understanding. Examples of these big ideas are the links between structure and function in living organisms, the particulate model as the key to understanding the properties and interactions of matter in all its forms, and the resources and means of transfer of energy as key determinants of all of these interactions. They should be encouraged to relate scientific explanations to phenomena in the world around them and start to use modelling and abstract ideas to develop and evaluate explanations.

Pupils should understand that science is about working objectively, modifying explanations to take account of new evidence and ideas and subjecting results to peer review. Pupils should decide on the appropriate type of scientific enquiry to undertake to answer their own questions and develop a deeper understanding of factors to be taken into account when collecting, recording and processing data. They should evaluate their results and identify further questions arising from them.

‘Working scientifically’ is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Teachers should feel free to choose examples that serve a variety of purposes, from showing how scientific ideas have developed historically to reflecting modern developments in science.

Pupils should develop their use of scientific vocabulary, including the use of scientific nomenclature and units and mathematical representations.

Intent

At Brownlow, our Science curriculum is designed to develop our pupil’s passion for science so that every child is excited by scientific ideas and wants to learn to explain and analyse phenomena, make predictions and solve problems. The Science curriculum fosters a curiosity in pupils. Throughout the programmes of study, the children will acquire and develop the key knowledge that has been identified within each unit and across each year group, as well as the application of scientific skills. We ensure that the Working Scientifically skills are built-on and developed throughout children’s time at the school so that they can apply their knowledge of science when using equipment, conducting experiments, and explaining concepts confidently and continue to ask questions and be curious about their surroundings. In conjunction with the aims of the National Curriculum, our Science teaching offers opportunities for all children to develop scientific knowledge and conceptual understanding through the specific disciplines of Biology, Chemistry and Physics and be equipped with the scientific knowledge required to understand the uses and implications of Science, today and for the future. Science is clearly taught in the curriculum, in its own right, from the early years to the end of KS2. The science curriculum focuses on the development of key concepts over time. The school’s curriculum is planned and sequenced so that new knowledge and skills build on what has been taught before and towards its clearly defined end points for each year group. Pupils learn, over many years, extensive and connected knowledge of substantive concepts. This means that the content should be arranged in a logical order and that enough time be provided for pupils to learn the content properly. Pupils develop, over time, their knowledge of substantive concepts. This means growing their schema of key concepts such as force and habitat. For example, in Year 3 pupils will understand 'force' as pushes and pulls, and in Year 5 this will grow to include gravity and friction. The Reception curriculum is considered in sufficient detail to ensure that it supports pupils to learn science in Year 1. This includes being precise about the key vocabulary, concepts, and phenomena that they want children to acquire and experience. School has ensured cohesion between commercial schemes which do not cover both EYFS and KS1/2. Curricular planning breaks down the end goal (the composite) into the component knowledge required to achieve the end goal. Knowledge is sequenced so pupils develop increasingly extensive schemata that builds from what they already know. Substantive knowledge is sequenced to develop expanding knowledge of key concepts. The curriculum is structured to develop knowledge of core scientific concepts that transcend years and phases, for example state changes, forces, habitats. These core concepts will be revisited and built upon in different topics.

Our curriculum is well structured and sequenced to enable knowledge and skills to be revisited throughout the school. Prior learning, future learning and key vocabulary are clearly identified within our long term plans.

A scientist at Brownlow Fold:

- is curious and seeks to explain the world around them
- asks questions and investigates lines of enquiry
- learns about the work of other scientists, including their findings, theories and working practices
- works systematically, making and testing predictions, investigating and observing outcomes
- builds and modifies theories based on evidence as it is collected

Implementation

In order for the children to know more and remember more in each area of Science and to develop links between each unit, we implement a curriculum that is progressive throughout the school. Progression in scientific skills and knowledge are outlined in our Science long term plan, which is strongly linked to the National Curriculum. To facilitate this, we take an enquiry-based approach to teaching Science. Each unit focuses upon key questions that guide the teaching. Activities are carefully chosen to focus pupil attention on learning the curriculum intent. This includes sufficient time for practising using the knowledge. Teacher explanations are clear and build on what pupils already know. They make use of diagrams, models, animations and graphs and lots of examples. Teaching explicitly shows pupils what conceptual level they are learning about: macroscopic, sub microscopic, cellular or symbolic. This ensures pupils develop a sense of scale and can organise their knowledge in a meaningful way to reflect what is being studied. Teachers with strong subject knowledge use questioning to great effect by: reviewing prior knowledge and establishing what pupils currently know, supporting pupils to use challenging vocabulary within appropriate contexts to articulate scientific ideas eliciting and correcting misconceptions, helping pupils see why the misconception is wrong checking pupil understanding and providing feedback – paying particular attention to use of vocabulary. Pupils encounter the objects of study and/or their effects in the classroom. This involves observing phenomena they have never previously experienced. This might, for example, include the use of teacher demonstrations or hands-on practical work. Good use is made of the outside environment to support learning, for example observing plants and animals in their natural habitats. Over the course of study, teaching is designed to help pupils to remember long term the content they have been taught and to integrate new knowledge into larger ideas. All pupils are exposed to a wide range of fiction and non-fiction texts where they can develop their appreciation of scientists and scientific concepts. All teachers have expert knowledge in the science curriculum they teach, if they do not, they are supported to address gaps in their knowledge so that pupils are not disadvantaged by ineffective teaching. Teachers check pupils' understanding effectively and identify and correct misconceptions. Activities are planned to revisit previously learned content and build up pupils' fluency. Teachers present subject matter clearly, promoting appropriate discussion about the subject matter being taught. They check pupils' understanding systematically, identify misconceptions accurately and provide clear, direct feedback. In so doing, they respond and adapt their teaching as necessary without unnecessarily elaborate or individualised approaches. Teachers create an environment that focuses on pupils. The textbooks and other teaching materials that teachers select in a way that does not create unnecessary workload for staff – reflect the school's ambitious intentions for the course of study. These materials clearly support the intent of a coherently planned curriculum, sequenced towards cumulatively sufficient knowledge and skills for future learning and employment.

Learning Beyond the classroom

In the **Early Years** children begin their science journey through exploring environments to gain an initial understanding of the world around them.

Year 1 develop their scientific understanding and vocabulary by using our school grounds to understand how seasonal change occurs and to identify common plants and trees.

Year 2 develop their scientific understanding and vocabulary by using our school grounds to identify and explore different habitats. They explore growing plants in different places around the school and under different conditions.

Year 3 develop their scientific understanding and vocabulary with a visit to Blackpool Zoo to identify different animal skeletons, movement and nutrition and use the school grounds to understand how shadows are formed.

Year 4 develop their scientific understanding and vocabulary by participating in a VR session which links to their learning in Living Things and Habitats and using both the indoor and outdoor learning environment to investigate sounds.

Year 5 develop their scientific understanding and vocabulary with a visit to Jodrell Bank to study astronomical sources and black holes and our school grounds to investigate plants.

Year 6 develop their scientific understanding and vocabulary by using

Other Enrichment Opportunities: Children have the opportunity to take part in forest schools led by the Assistant headteacher.

Formal, summative assessment in science takes place at the end of each foundation subject assessment cycle stating whether children are Well Below, Below, Working Towards, Expected, Exceeding and Working above. Formative assessment takes place continually throughout the year: assessment for learning is used to ensure lessons are pitched appropriately and to inform future planning

Impact

In Science, progress is measured through a child's ability to know more, remember more and explain more. This can be measured in numerous ways in our units. The learning environment across the school is consistent with science technical vocabulary displayed, spoken and used by all learners. Through the delivery of the science curriculum, we provide pupils with a great depth of knowledge and a thorough understanding of science. Teaching scientific vocabulary throughout KS1 and KS2, ensures children in year 6 leave with excellent scientific knowledge and are prepared for secondary education. Pupils leave Brownlow with a wide range of scientific skills that can be

implemented in a range of contexts. The knowledge and skills acquired, help fuel every child's passion for science and continued drive for scientific learning. We strive to ensure that pupils achieve highly, embody our core values and have a deep knowledge and understanding of science

- The vast majority of pupils have a good basis of core scientific knowledge and vocabulary.
- Most pupils remember science content which includes science concepts taught in previous years.
- Pupil voice evidences that the vast majority of pupils feel successful in science.
- The vast majority of pupils are proficient at collecting and presenting data.
- Pupils know the types of scientific enquiry
- The vast majority of pupils have developed a detailed understanding of the disciplinary knowledge that underpins practical work and enquiry.
- Pupils know what they have learnt from practical work undertaken.
- All Pupils scientific skills are increasing.

All pupils are evidenced to be making at least good progress in science, as there is monitoring evidence to support the view that pupils know, remember and are able to apply the defined knowledge and skills to year group end- points.

- Pupils see a value in science, both personally and in relation to wider society and employment.
- The majority of pupils enjoy the subject and can explain its value.
- Pupils develop detailed knowledge and skills across the curriculum and, as a result, achieve well. This is reflected in the work that pupils produce.
- Pupils are clear on the most important knowledge they need to know
- The vast majority of pupils are able to demonstrate they know, remember and can apply the curriculum knowledge and skills to clearly defined year group and key stage end points.
- The curriculum ensures that the majority of children secure the early learning goal 'Understanding the world'?
- By the end of the EYFS most pupils are ready for the science curriculum content in year 1.
- All teachers can pinpoint pupils' progress, have high expectations, and get the best from pupils.
- Pupils with SEND achieve the best possible outcomes in the subject and make strong progress from their starting points

Different types of Knowledge in Science

Disciplinary knowledge

Disciplinary knowledge (outlined in the working scientifically sections of the NC)

Does the curriculum identify what disciplinary knowledge underpins working scientifically?

Do plans break down these concepts and procedures into their components?

Do plans outline how disciplinary knowledge advances over time?

Are pupils taught disciplinary knowledge or simply expected to acquire it by carrying out practicals?

Are pupils equipped with the necessary mathematical knowledge?

Substantive Knowledge

Referred to as scientific knowledge and conceptual understanding in the NC

Do plans identify the most important substantive concepts?

Do plans anticipate and address common misconceptions

Substantive: components and sequencing

Do plans break down end goals into their component parts? Are these component parts sequenced so that pupils build schemata for important concepts over time?

Interplay between substantive and disciplinary knowledge

Is disciplinary knowledge paired with the most appropriate scientific concepts?

Do pupils learn about the different types of scientific enquiry i.e. not just fair tests?

Is scientific enquiry more than just practical work or data collection? Once the necessary prior knowledge has been secured can pupils: - ask and answer their own scientific questions?

Disciplinary Knowledge

	Methods to answer scientific questions	Apparatus and techniques, including measurement	Analysis, presentation and evaluation of scientific data to draw valid conclusions	Development of scientific knowledge over time and its implications
Key Stage One	Asking simple questions. Identifying and classifying.	Gathering and recording data. Observing closely using simple equipment e.g. hand lens.	Using their ideas and observations to suggest answers to questions.	

Lower Key Stage Two	Using different types of scientific enquiries to answer questions. Setting up fair tests, make predictions.	Taking accurate measurements using standard units, using a range of equipment including thermometers.	Recording findings using bar charts, keys, tables, labelled diagrams. Draw conclusions. Make predictions for new values, suggest improvements.	Using scientific evidence to support findings.
Upper Key Stage Two	Planning different types of scientific enquiries. Recognising and controlling variables.	Taking measurements with increasing accuracy and precision. Taking repeat readings.	Scatter graphs, line graphs, causal relationships. Degree of trust in results.	Identify scientific evidence used to support or refute ideas or arguments.

Enquiry Types and Working Scientifically objectives

Enquiry Types	Working Scientifically	
Research Using Secondary Sources	Planning	- Asking relevant questions and using different types of scientific enquiries to answer them. - Set up simple practical enquiries, comparative and fair tests
Observing Over Time	Observing	- Make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, - Use a range of equipment, including thermometers and data loggers
Pattern Seeking	Recording	- Gather, record, classify and present data in a variety of ways to help in answering the question - Record findings using simple scientific language, drawings, labelled diagrams, bar charts, and tables - Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
Identifying, Classifying and Grouping	Concluding	- Report on findings from enquiries, including oral and written, displays or presentations of results and conclusions, - Identify differences, similarities or changes related to simple scientific ideas and processes - Use straightforward scientific evidence to answer questions or to support their findings - Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
Comparative and fair testing	Evaluating	Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests.

Whole School Concepts/Golden Threads

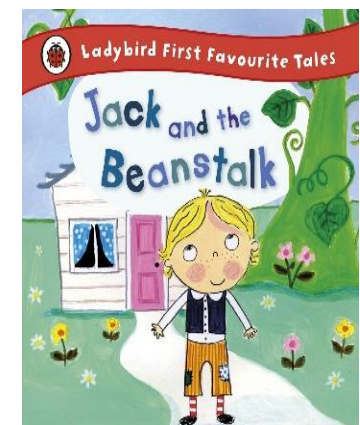
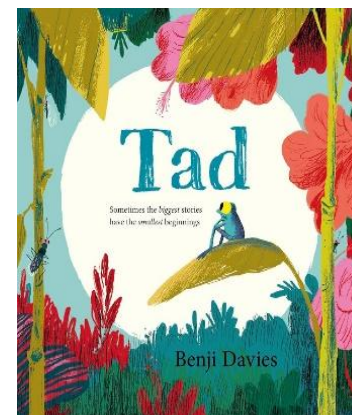
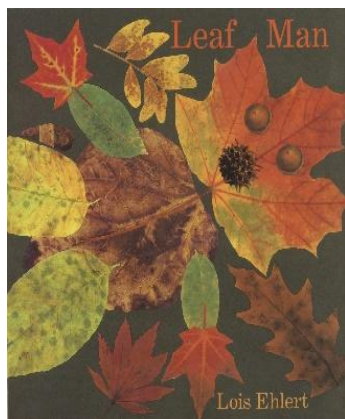
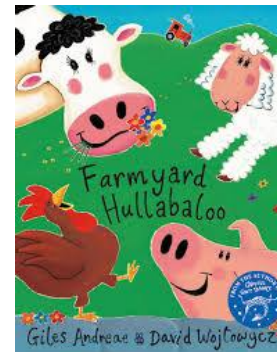
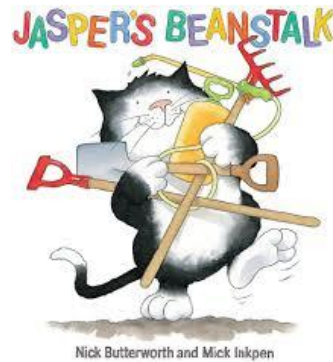
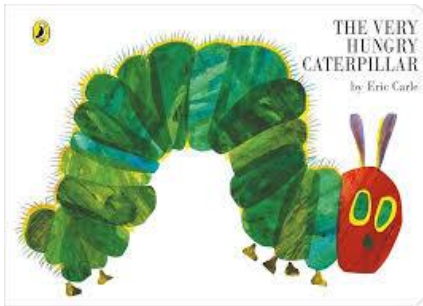
We have identified the key concepts that run through our curriculum which supports both teachers with delivering learning in a more impactful way and children with developing links and making connections between prior, current and future learning. Golden Threads (or Big Ideas) in Primary Science are overarching themes that provide coherence and depth across different science units. Below are the 'Golden Threads' that feature in the Curriculum for Science:

Working Scientifically	Change Over Time	Cause and Effect	Structure and Function	Cycles and Systems
A continual thread across all years, encouraging: Asking questions Planning and carrying out investigations Observing and measuring Recording and interpreting data Drawing conclusions and evaluating	Understanding processes such as: Growth (plants and animals) Seasonal and daily changes Reversible/irreversible changes in materials	Exploring: How forces affect motion How electricity powers devices How light and sound behave	Looking at: Parts of plants and animals and their functions Properties of materials related to their use	Building understanding of: • Life cycles • The water cycle • Systems like circuits or ecosystems

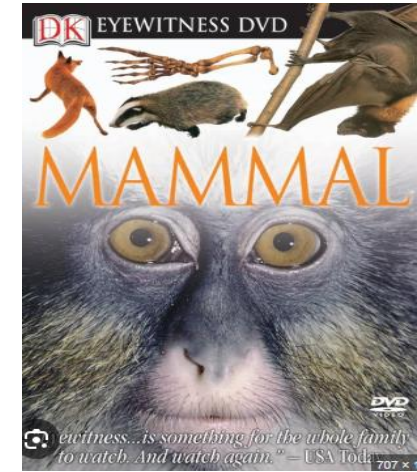
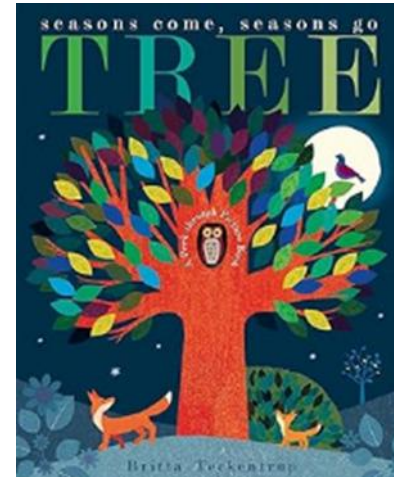
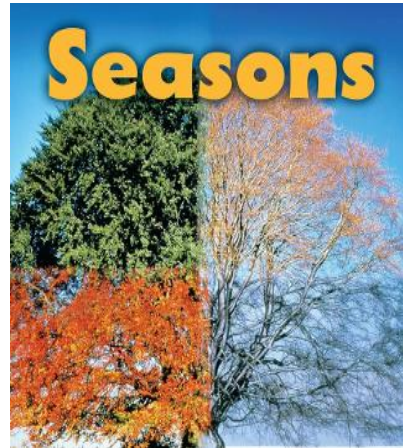
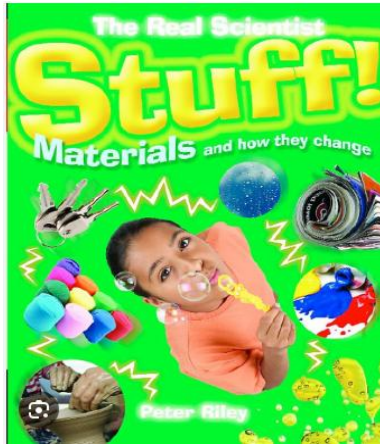
High quality resources and texts underpinning our curriculum

Art is promoted and prioritised at Brownlow Fold which means knowledge and vocabulary is consistently being revisited throughout the curriculum. We use high quality texts to inspire our children to create high quality pieces of writing, encourage the love of reading and embed their skills further. These texts are chosen so that they are accessible and engaging for all children within the class. Children have access to a range of fabulous resources which are used to support learning. Each year group has access to various resources linked to each of their topics

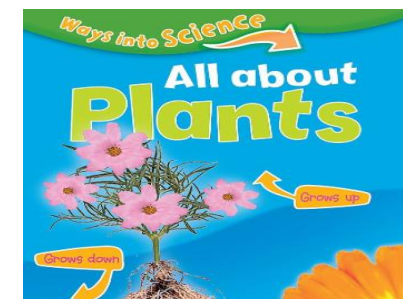
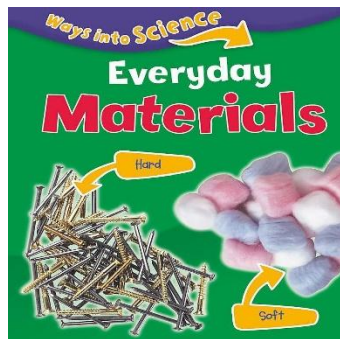
Early Years: Nursery and Reception



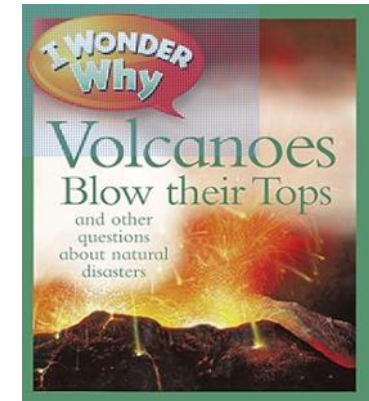
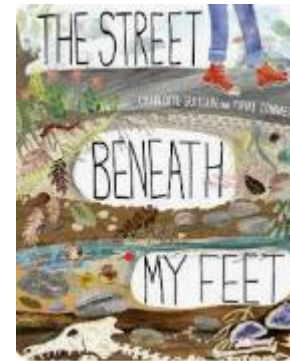
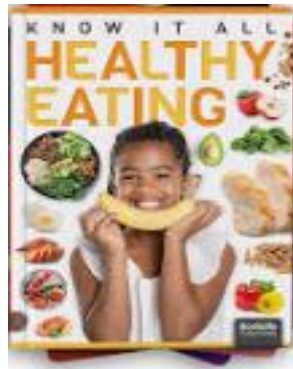
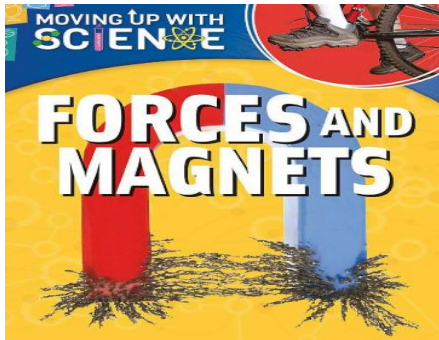
Year One



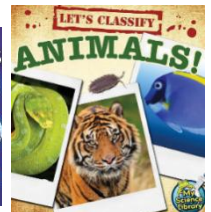
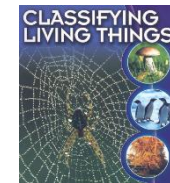
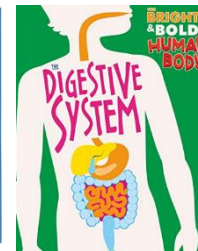
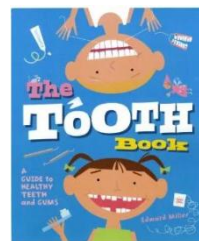
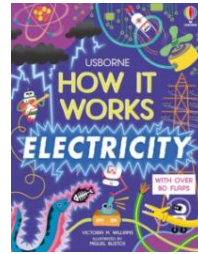
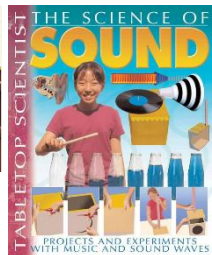
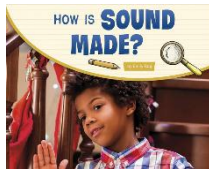
Year Two



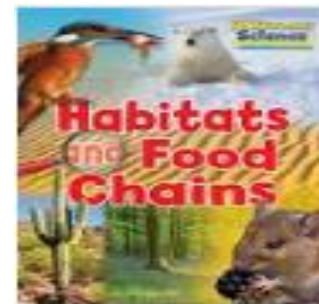
Year Three



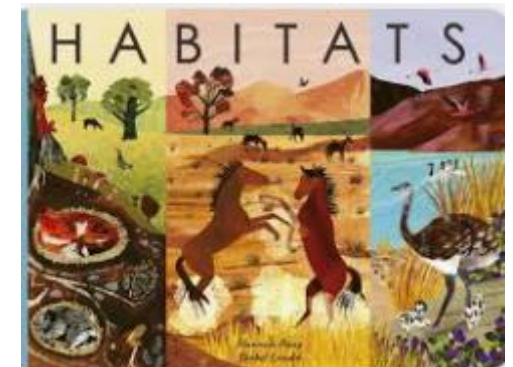
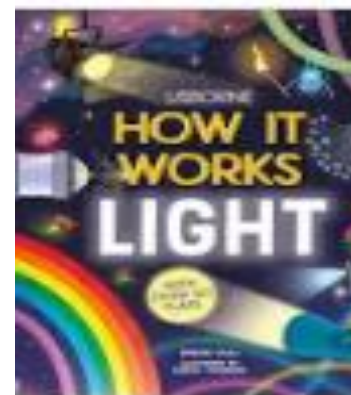
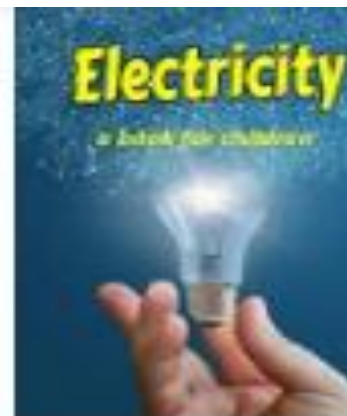
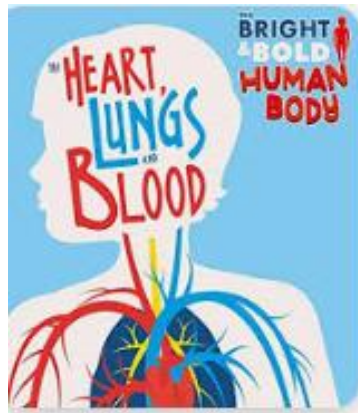
Year Four



Year Five



Year Six



The Brownlow Science Curriculum Long Term Plan

	Autumn	Spring	Summer
EYFS Nursery	Animals including Humans Do you know what the five senses are? How can I use them to explore?	Seasonal change What happens to the world around us in Winter?	Living Things and Habitats How can I care for and respect the natural environment and living things?
EYFS Reception	Seasonal change Why are there so many leaves on the floor?	Light and Shadows Is it always dark at night time?	Living Things and Habitats Why is our world so amazing?
Year One	Seasonal change Do you know how things change as the seasons change? Every Day Materials What are the different materials and what are they used to make?	Seasonal change Do you know how things change as the seasons change? Animals including humans What are the differences between herbivores, carnivores and omnivores?	Seasonal change Do you know how things change as the seasons change? Plants and Trees Can you identify what different plants and trees look like?
Year Two	Materials Do you know how to group, classify and compare materials?	Animals including Humans Do you know what animals and humans need to be able to survive?	Living Things and Habitats Do you know why different living things live in different places? Plants Do you know how to look after and grow a plant?
Year Three	Forces and Magnets What is the difference between friction and a magnetic force?	Animals including Humans How do animals and humans stay healthy? Rocks and Soils Can you explain how rocks formed?	Light and Shadows Can you explain how shadows are formed? Flowering Plants How do the parts of a plant help it to grow?

Year Four	Sound Can you explain how sounds are made and absorbed?	Electricity Can you create a robot that lights up and makes a sound? Animals, including Humans – Teeth and digestion What happens to the food you eat?	States of Matter What happens when solids, liquids and gases are heated or cooled? Living Things and their habitats Can you group and categorise different groups of living things?
Year Five	Earth and Space Which celestial bodies are in our solar system? Forces How do forces make things move, get faster or slow down?	Properties and changes of materials What methods can you use to separate solids, liquids and gases?	Animals, including humans: Life cycles How do different animals, including humans, change as they grow? Living Things and their Habitats: Plants How do plants reproduce?
Year Six	Electricity Can you use electrical components to create a circuit? Animals including Humans Can you explain how the systems in the body work together?	Light Do you know how light travels?	Evolution and inheritance How are genetics passed down through evolution? Living things and their habitats What is classification and why is it important?

Teaching Sequence

- Prior Learning/Retrieval of previous knowledge
- Pupils complete the pre learning task for the unit of work.
- Pupils are introduced to the key vocabulary and key knowledge
- The teacher teaches the curriculum content for that aspect of the curriculum using retrieval practice/Metacognitive strategies

- The teacher formatively assesses the pupil's progress throughout the duration of the unit of work through marking/pupil discussion/pupil workbook evidence etc.
- One day each week the teacher makes explicit links across the curriculum in a specific Retrieval Practice session
 - Retrieval Practice Sessions are 30 minutes for pupils in KS1.
 - Retrieval Practice Sessions are 45 minutes for pupils in KS2.
 - Retrieval Practice pupil work is documented in a Retrieval Practice Book.

Retrieval Practice sessions incorporate aspects of the whole of the curriculum from that year group from different periods of time.

- Topics taught in a given term are regularly retrieved through lesson starters during the term it is being taught.
- Retrieval lessons on Tuesday mornings revisit learning from the previous term. For example, if The Titanic is taught in Autumn 1, it will be revisited in retrieval lessons during Autumn 2.
- Pupils complete a Green for Growth check at the end of the following term e.g. Titanic in history in Year 6 is taught in Autumn 1. Therefore, the Green for Growth Check takes place on a specified week in Autumn 2.
- Green for Growth checks are documented in the Retrieval Practice Book.
- Children are given specified periods of time to complete the Green for Growth Check:
 - Key Stage One - 20 minutes
 - Key Stage Two - 30 minutes
- The Teacher uses the evidence base (pupil workbook, pupil retrieval practice book, Green for Growth Check) to make a 'professional judgement' about a pupils attainment. The teacher inputs the data on to BROMCOM using the year group end points for that subject.
- In some subjects the assessment is based on a final, finished piece of work such as a musical performance (solo or ensemble), a sporting performance (e.g. dance, gymnastics) or competency in team games and tactics. Hand-written pre-learning tasks for these subjects would not be appropriate; however, pupils' musical or sporting competence is informally assessed by Bolton Music service and class teachers/Commando Joe coaches.

Curriculum Conversation/Retrieval Practice: Science

Each half term the children are split into mixed year groups and all teachers lead a 'Curriculum Conversation.' This provides the children with the opportunity to share their learning with others and make connections between components. Children are therefore more likely to remember key knowledge in the long term. Our curriculum builds on prior learning and re-visits content, supporting the children to develop strong schemata.

Research-Informed Questioning Techniques

- Use **"What do you remember about...?"** as a regular warm-up.
- Incorporate **retrieval practice** into daily and weekly routines.
- Make use of **multiple choice**, **true/false**, and **odd one out** formats.
- Ask pupils to **draw and label** to reinforce memory.
- Use **talk partners** and **mini-whiteboards** for low-stakes recall.

Example Weekly Retrieval Cycle

Day	Activity
Monday	3 questions from last week's topic
Tuesday	3 questions from a previous term
Wednesday	Vocabulary recall (e.g., "What does 'root' mean?")
Thursday	Picture quiz / draw and label activity
Friday	Mixed-topic quiz (3–5 quick-fire questions)

Science Knowledge Retrieval

Nursery

Everyday Exploration

What happens when you mix water and sand?

Can you find something that floats? What about something that sinks?

What do you notice about the ice? What happens to it in the sun?

Can you find something that makes a loud noise? A quiet one?

Living Things and Nature

What do plants need to grow?

Can you name some animals that live in the water?

What do you notice about this leaf? How is it different from that one?

What happens to the trees in autumn?

Weather and Seasons

What is the weather like today?

How is today's weather different from yesterdays?

What clothes do we wear when it's cold?

What do we see in the sky during the day? At night?

Forces and Materials

What happens when you roll the ball on the carpet? What about on the floor?

Which objects are soft? Which are hard?

Can you find something that you can stretch?

What do magnets stick to?

Encouraging Scientific Thinking

What do you think will happen if...?

Why do you think that happened?

Can you think of another way to do it?

What do you notice when we do that?

Reception

Living Things and Nature

What do plants need to grow?

Can you name some animals that live on a farm/in a forest/in the sea?

What changes can you see on a tree in autumn/spring?

How can we care for living things like plants or animals?

Weather and Seasons

What is the weather like today?

How do we dress when it's sunny/rainy/windy?

What happens when it gets cold outside?

What changes in the environment do you notice in winter?

Materials and Properties

What happens when you mix water and flour?

Which objects are hard? Which are soft?

Can you find something shiny? Something rough?

What can you build using blocks or natural materials?

Forces and Movement

What happens when you push or pull a toy car?

How can you make the ball go faster or slower?

What happens when you drop a feather and a stone?

Can you make something move without touching it?

Scientific Thinking (Encouraging Prediction and Explanation)

What do you think will happen if we leave the ice in the sun?

Why do you think that floated/sank?

What do you notice about the way this grows/melts/moves?

Can you find something that changes when you add water

Year One

Humans and Animals	Animals Including Humans	Plants	Seasonal Changes	Materials (Everyday Materials)
What are the names of the five senses?	Can you name a mammal? A bird? A fish?	What do plants need to grow?	What season is it now?	What is wood used for? What is metal used for?
Which part of your body helps you to see?	Which animals have fur? Which have feathers?	Can you name some parts of a plant?	What changes do we see in autumn? In spring?	Can you name some materials?
What do we use our ears for?	What do all animals need to stay alive?	Which part of a plant grows in the soil?	What is the weather like in summer?	What things are made of plastic?
Can you name some parts of the body?	What do humans need to stay healthy?	What do roots do?	Why do trees lose their leaves?	What material is soft? What material is hard?
What is the difference between a human and a dog?	What is a herbivore, carnivore, and omnivore?	Can you name a tree? A flower?	What clothes do we wear in winter?	What's the difference between glass and metal?

Year Two

Animals Including Humans	Plants	Uses of Everyday Materials	Living Things and Their Habitats	Working Scientifically (Skills-Based Questions)
What do animals, including humans, need to survive?	What do plants need to grow and stay healthy?	Can you name some materials and what they are used for?	What is a habitat?	What do we need to do to make a test fair?
Can you name the basic needs of all living things?	What are the parts of a plant?	Why is glass used for windows and not for shoes?	Can you name some different habitats (e.g., woodland, ocean, desert)?	How do we record what we find out in an investigation?
What are the stages in a human's life?	What job does the stem do?	What does it mean if a material is waterproof?	What do animals need from their habitat?	What equipment do we use to measure things in science?
What is a balanced diet?	How can we tell if a plant is healthy or unhealthy?	Which materials can change shape?	What is the difference between living, dead, and never alive?	What did you notice? What changed?
What do humans use their skeleton and muscles for?	What do the roots do?		What is a microhabitat?	How can we explain what happened in our experiment?

Can you group these objects by the material they're made from?

Why do different animals live in different habitats

Year Three

Animals Including Humans

What are the three main types of skeleton?

What is the purpose of a skeleton?

What do muscles do?

Can you name some bones in the human body?

How do skeletons help animals move?

Rocks

What are the three types of rock?

How are sedimentary rocks formed?

What is soil made from?

What is a fossil and how is it formed?

Can you name a rock that is hard/soft/porous?

Plants

What do plants need to grow well?

What are the parts of a plant?

What is the job of the roots?

What happens during photosynthesis?

How does water travel through a plant?

Light

What is a light source?

Why can we see things?

What is a shadow?

How are shadows formed?

Why do shadows change size?

Forces and Magnets

What is a force?

What does it mean to “repel” or “attract”?

Which materials are magnetic?

What are magnets used for?

How can we test the strength of a magnet?

Working Scientifically (General Skills)

What makes a test fair?

How do we record results?

What equipment might we use in an investigation?

How can we present our findings?

What did you observe and what does it tell you?

Year Four

Animals Including Humans (Digestive System & Teeth)

What is the function of the digestive system?

Can you name the main parts of the digestive system?

What is the job of the stomach?

What are the different types of teeth, and what are they used for?

Why is it important to look after our teeth?

Electricity

What is an electrical circuit?

Can you name the components of a simple circuit?

What materials are electrical conductors?

What happens when a circuit is broken?

What are insulators, and why are they useful?

Living Things and Their Habitats

What are the characteristics of living things?

What does it mean to classify animals?

What is the difference between vertebrates and invertebrates?

Can you name the five vertebrate groups?

What is a classification key used for

States of Matter

What are the three states of matter?

What happens when a solid melts?

At what temperature does water freeze?

What is evaporation and where might we see it?

How does the water cycle work?

Sound

How is sound made?

How does sound travel?

What happens to sound when you move further away?

What is pitch and how can it change?

What materials can absorb or block sound?

Working Scientifically

How can you make a test fair?

What equipment could you use to measure temperature or sound?

What did you observe in your investigation?

How can you record and present your results?

What did your results show?

Year Five

Animals Including Humans (Life Cycles & Reproduction)

What are the stages in the life cycle of a mammal?

How do amphibians and insects change as they grow?

What is metamorphosis?

How do plants reproduce?

What is the role of pollination and fertilisation in plant reproduction?

Living Things and Their Habitats (Classification)

What does it mean to classify living things?

What are the main groups of vertebrates?

What is an invertebrate? Can you name some?

How do scientists group and classify plants and animals?

What is a classification key and how is it used?

Forces

What is gravity and who discovered it?

How does air resistance affect moving objects?

What is friction and how can it be helpful or unhelpful?

What do levers, pulleys, and gears do?

How can water resistance slow down movement?

Earth and Space

What are the planets in our solar system?

Why do we have day and night?

Why does the Moon appear to change shape?

What causes the seasons?

How does the Earth orbit the Sun?

Properties and Changes of Materials

What are the properties of solids, liquids, and gases?

What materials are soluble or insoluble in water?

What is a reversible change? Give an example.

What is an irreversible change? Give an example.

How can mixtures be separated (e.g., filtering, sieving, evaporating)?

Working Scientifically

What makes a test fair?

What variables do we change, measure, and keep the same?

How can you present your results clearly?

What conclusions can you draw from your results?

How do you know if your test was accurate?

Year Six

Living Things and Their Habitats

What are the seven life processes?
(MRS GREN)

How can plants reproduce without seeds?

What are the differences between vertebrates and invertebrates?

Give an example of how animals are classified into groups.

What is a fair test? Give an example.

Why is it important to only change one variable at a time?

How do you decide which equipment is needed for an experiment?

What does it mean to take a reading accurately?

Which units would you use to measure temperature? Volume? Length?

Why is it important to repeat measurements in an investigation?

How can you record results clearly in a table?

What kind of graph would you use for continuous data?

Why is it useful to draw bar charts or line graphs?

How would you explain your results to someone who wasn't there?

Animals Including Humans

What are the main functions of the circulatory system?

Name the three types of blood vessels and describe their functions.

How does the heart pump blood around the body?

What role do nutrients play in keeping our bodies healthy?

Evolution and Inheritance

What is inheritance?

How do fossils provide evidence for evolution?

What characteristics might be inherited from parents?

Explain the term "adaptation" with an example.

Light

How does light travel?

What causes shadows to form?

How do we see objects?

What is reflection and how is it useful?

Electricity

What is a circuit?

Name three good conductors of electricity.

What happens if a circuit is not complete?

What is the purpose of a switch in an electrical circuit?

What might you include in a scientific conclusion?

Why is it important to share both expected and unexpected results?

What patterns can you look for in your results?

How do you know if your results support your prediction?

What should you do if your results don't match your prediction?

End Point Progression in Science

EYFS Science End Points What will the children be able to know and do?

Nursery

Understanding the World: The Natural World

Exploration and Observation

- Show curiosity about objects, materials, living things, and natural phenomena.
- Use their senses (sight, touch, sound, smell, taste) to explore their environment.
- Begin to notice changes (e.g., melting ice, wilting plants, shadows).
- Observe plants and animals, talking about what they see.

Research-informed focus:

- **Sensory exploration** is fundamental at this stage.
- **Repetition and guided questioning** support memory and language development.
- Adults should model curiosity and use rich vocabulary.

Cause and Effect

- Begin to notice cause-and-effect relationships (e.g., “If I push this, it rolls,” or “When I water the plant, it grows”).
- Explore materials to see what happens (e.g., mixing, pouring, shaking, freezing).
- Begin to make simple predictions and test them through play.

Research-informed focus:

- Early science is developed through **exploratory play**, **modelling thinking aloud**, and **scaffolding questions** (“What do you think will happen if...?”).

Language and Communication in Science

- Use some scientific vocabulary in context (e.g., “wet,” “hot,” “grow,” “loud”).
- Talk about what they see, hear, and feel.

Reception

Area of Learning: Understanding the World – The Natural World (ELG)

Exploration and Observation

- Make detailed observations about animals, plants, and materials using all their senses.
- Talk about similarities, differences, patterns, and change (e.g., plant growth, freezing/melting).
- Ask questions about the world around them and seek answers through exploration.

Research-informed focus:

Support children’s curiosity with **open-ended questioning** and **first-hand experiences**. Encourage **sustained shared thinking** with adults (e.g., “What do you notice?”, “Why do you think that happened?”).

Understanding Living Things

- Identify and name a variety of animals and plants in their local environment.
- Understand basic needs of living things (e.g., water, light, food, air).
- Talk about lifecycles (e.g., frogspawn to frog, seed to plant).

Research-informed focus:

Use **concrete, real-world examples** (e.g., planting seeds, raising butterflies) and **repeated observation** over time to support understanding of growth and change.

Materials and Physical Processes

- Explore and describe the properties of different materials (e.g., hard, soft, waterproof, magnetic).
- Recognise and talk about changes in materials (e.g., melting, freezing, dissolving).

- Begin to explain changes they notice (e.g., “It melted because it was hot”).

Research-informed focus:

- **Language-rich environments** and **adult-child interactions** are essential.
- Use of **songs, stories, and role play** to reinforce understanding.

Understanding Living Things

- Show care and curiosity for living things (e.g., plants, animals, insects).
- Recognise some basic needs of living things (e.g., “plants need water”).
- Begin to understand growth and life cycles (e.g., planting seeds, observing caterpillars).

Research-informed focus:

- Children benefit from **hands-on, real-world experiences** (e.g., gardening, minibeast hunts).
- **Repetition and storytelling** help embed foundational biological concepts.

Understanding the Environment and Seasonal Change

- Begin to talk about the weather and seasonal changes.
- Notice changes in the environment (e.g., leaves falling, puddles forming).
- Show awareness of the world around them (e.g., trees, birds, sky).

Research-informed focus:

- Focus on **daily, seasonal routines** and **concrete experiences**.
- Use outdoor learning to build understanding of environmental science.

Pedagogical Principles Based on Research

- **Child-led exploration** and **guided adult interaction** are both vital.
- Encourage **talk and vocabulary development** in context.
- Use **real objects and first-hand experiences** rather than worksheets.
- Prioritise **repetition, hands-on play, and storytelling**.

- Make simple predictions and observations during playful experiments (e.g., “What will float?”).

Research-informed focus:

Learning should be **hands-on** and **embedded in play**. Adults guide understanding through **scaffolded dialogue** and **modelling language** (e.g., “That’s stretchy like elastic”).

Seasonal and Environmental Change

- Describe the features of the changing seasons and typical weather patterns.
- Observe and describe the natural world, including day/night and environmental features (e.g., trees, sky, shadows).
- Begin to understand how humans and animals adapt to the environment (e.g., warm clothes in winter).

Research-informed focus:

Outdoor learning and **seasonal routines** (e.g., daily weather checks) help children build mental models of time, pattern, and environmental change.

Scientific Language and Communication

- Use scientific vocabulary in context (e.g., “grow,” “change,” “hard,” “float,” “light”).
- Explain their thinking using full sentences and observations (e.g., “The ice melted because it got warm”).
- Begin to explain cause and effect based on what they see.

Research-informed focus:

Vocabulary should be **taught explicitly** and used consistently. Oral language development is foundational for future science learning.

Summary of Reception Science End Points

Strand	End Point Example Outcomes
Exploring & observing	Talks about changes and patterns they notice in nature
Living Things	Names animals/plants; knows what they need to survive
Materials & Physical World	Describes properties and changes (melting, dissolving)
Seasons & Environment	Talks about weather, seasons, day/night

- Provide **scaffolding** to help children link observations to ideas (e.g., "Why do you think that happened?"). **Summary of Nursery Science End Points**

Strand	End Point Examples
Exploring & observing	Explores natural materials, uses senses to investigate
Cause & Effect	Predicts simple outcomes; explores change
Scientific Language	Begins using words like "hot," "grow," "loud," "wet"
Living Things	Shows care and curiosity; knows plants need water
Seasons & Environment	Notices weather, seasonal changes, and natural patterns

Scientific Language

Uses vocabulary like "grow," "hard," "cold," "change"

Pedagogical Principles Based on Research

- **First-hand experiences** are key (e.g., gardening, cooking, exploring puddles).
- Use **play-based exploration** supported by **adult modelling and questioning**.
- Embed **scientific thinking** through stories, discussions, and problem-solving.
- Use **rich vocabulary, visual prompts, and open-ended questions**.

KS1 Science End Points

What will the children be able to know and do?

Year One

- Ask simple scientific questions based on their observations and experiences.
- Use basic scientific vocabulary to describe what they see and investigate.
- Perform simple tests with support and begin to make comparisons.
- Observe closely using simple equipment (e.g., magnifying glass, hand lenses).
- Record findings using drawings, charts, or verbal explanations.
- Begin to identify patterns and suggest explanations using everyday language.
- Use results to suggest answers to questions and reflect on what they've learned.

Plants

- Identify and name a variety of common garden plants, including deciduous and evergreen trees.
- Describe the basic structure of a variety of common flowering plants, including trees (e.g., leaf, stem, flower, root).
- Recognise that plants grow and change over time and need water and light to survive

Year Two

- Ask and answer simple scientific questions using first-hand experience.
- Make simple predictions and suggest what might happen in an investigation.
- Use simple equipment to carry out tests safely (e.g., magnifiers, measuring jugs).
- Make careful observations and use simple measurements (e.g., non-standard units).
- Record findings in simple ways: drawings, charts, or tables.
- Use results to describe what happened and suggest why.
- Begin to identify simple patterns and draw conclusions.

Living Things and Their Habitats

- Explore and compare the differences between things that are living, dead, and never alive.
- Identify that most living things live in habitats to which they are suited.
- Name a variety of plants and animals in different habitats, including microhabitats.
- Describe how animals obtain their food from plants and other animals (simple food chains).
- Identify and name producers, prey, and predators in a simple food chain.

Animals, Including Humans

- Identify and name a variety of common animals including fish, amphibians, reptiles, birds, and mammals.
- Recognise and group animals that are carnivores, herbivores, and omnivores.
- Describe and compare the structure of a variety of common animals.
- Identify, name, draw, and label the basic parts of the human body.
- Link body parts with associated senses (e.g., eyes = seeing).

Seasonal Changes

- Observe and describe changes across the four seasons.
- Describe weather associated with each season.
- Recognise how the length of day changes over the year

Everyday Materials

- Distinguish between an object and the material it is made from.
- Identify and name a variety of everyday materials (e.g., wood, plastic, glass, metal, water, rock).
- Describe the simple physical properties of a variety of everyday materials.
- Compare and group together a variety of materials based on their physical properties.

Animals, Including Humans

- Notice that animals, including humans, have offspring which grow into adults.
- Describe the basic needs of animals, including humans, for survival (water, food, air).
- Describe the importance of exercise, eating the right amounts of food, and hygiene.

Plants

- Observe and describe how seeds and bulbs grow into mature plants.
- Describe how plants need water, light, and a suitable temperature to grow and stay healthy.

Uses of Everyday Materials

- Identify and compare the uses of a variety of everyday materials (e.g., wood, metal, plastic, glass, brick, rock, paper, cardboard).
- Compare how things move on different surfaces.
- Find out how the shapes of solid objects can be changed by squashing, bending, twisting, and stretching.

Lower KS2 Science End Points
What will the children be able to know and do?

Year Three

- Ask relevant scientific questions and use different types of scientific enquiry to answer them.
- Set up simple practical enquiries and fair tests with support.
- Make systematic observations and take simple measurements.
- Record findings using drawings, labelled diagrams, keys, bar charts, and tables.
- Use results to draw simple conclusions and make predictions for new values.
- Use scientific evidence to answer questions or support findings.

Plants

- Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves, and flowers.
- Explore and explain what plants need to grow and stay healthy (including light, water, nutrients from soil, and room to grow).
- Investigate and describe how water is transported within plants.
- Explore the life cycle of a flowering plant, including pollination, seed formation, and seed dispersal.

Animals, Including Humans

- Identify that animals, including humans, need the right types and amount of nutrition.
- Understand that animals cannot make their own food and get nutrition from what they eat.
- Identify that humans and some other animals have skeletons and muscles for support, protection, and movement.

Rocks

- Compare and group different kinds of rocks based on appearance and physical properties.
- Describe how fossils are formed when things that have lived are trapped in rock.
- Recognise that soils are made from rocks and organic matter.

Year Four

- Set up simple fair tests and practical enquiries with increasing independence.
- Ask relevant scientific questions and use different types of enquiry to answer them.
- Make careful, accurate observations and use standard units when measuring.
- Record findings using drawings, keys, tables, bar charts, and other simple scientific formats.
- Identify patterns in results and use them to draw conclusions.
- Use scientific language to explain and justify their ideas.

Animals, Including Humans

- Describe the basic functions of the digestive system in humans.
- Identify and name the different types of teeth in humans and their functions.
- Construct and interpret a simple food chain, identifying producers, predators, and prey.

States of Matter

- Group materials as solids, liquids, or gases.
- Observe and describe how materials change state when they are heated or cooled.
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Electricity

- Identify common appliances that run on electricity.
- Construct a simple series circuit and name its basic components (bulbs, wires, switches, batteries).
- Recognise that a complete circuit is needed for a device to work.
- Identify conductors and insulators, and associate metals with conductivity.

Light • Recognise that we need light to see things and that darkness is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and know ways to protect their eyes. • Recognise and explain how shadows are formed and investigate how their size changes. Forces and Magnets • Compare how things move on different surfaces. • Notice that some forces need contact, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials but not others. • Compare and group everyday materials on the basis of whether they are magnetic. • Describe magnets as having two poles and predict whether they will attract or repel.	Living Things and Their Habitats • Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys to group, identify, and name living things in their local and wider environment. • Recognise that environments can change and this can sometimes pose dangers to living things. Sound • Identify how sounds are made and recognise that vibrations travel through a medium to the ear. • Find patterns between the pitch of a sound and the features of the object producing it. • Find patterns between the volume of a sound and the strength of the vibrations. • Recognise that sounds get fainter as the distance from the sound source increases.
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Upper KS2 Science End Points What will the children be able to know and do?	
Year Five	Year Six
• Plan different types of scientific enquiries to answer questions. • Control variables where necessary in a fair test. • Take accurate and precise measurements using scientific equipment (e.g., thermometers, force meters). • Record data and results using tables, line graphs, and diagrams. • Report and present findings in oral and written forms using scientific vocabulary. • Use evidence to support or refute ideas and explain results, identifying causal relationships. Living Things and Their Habitats • Describe the differences in the life cycles of a mammal, amphibian, insect, and bird. • Describe the life process of reproduction in some plants and animals.	• Plan and carry out fair tests and other types of scientific enquiry. • Identify and control variables accurately in an investigation. • Take precise and reliable measurements using a range of scientific equipment. • Record complex data using tables, line graphs, bar charts, and scientific diagrams. • Draw conclusions based on their data and scientific understanding. • Identify scientific evidence that supports or contradicts arguments. • Communicate findings clearly using appropriate scientific vocabulary and formats. Living Things and Their Habitats • Classify living things into broad groups according to observable characteristics and similarities/differences.

Animals, Including Humans

- Describe changes as humans develop from birth to old age.
- Understand the stages of human development (including puberty).

Properties and Changes of Materials

- Compare and group materials based on properties (e.g., hardness, solubility, conductivity).
- Know that some materials dissolve in liquid to form a solution.
- Use knowledge of solids, liquids, and gases to decide how mixtures might be separated.
- Demonstrate reversible and irreversible changes.

Earth and Space

- Describe the movement of the Earth and other planets relative to the Sun.
- Describe the movement of the Moon relative to the Earth.
- Understand the Earth's rotation and its relation to day and night.
- Use models to describe phenomena (e.g., orbits, day/night).

Forces

- Explain that unsupported objects fall due to gravity.
- Identify the effects of air resistance, water resistance, and friction.
- Recognise that some mechanisms (levers, pulleys, gears) allow a smaller force to have a greater effect.

Pedagogical and Assessment Strategies

In line with cognitive science and Ofsted's science research review:

- **Spaced retrieval** and **interleaving** to strengthen memory.
- Emphasis on **scientific vocabulary** and accurate use in context.
- Opportunities for **conceptual understanding** and **disciplinary knowledge** (how science works).
- Frequent use of **low-stakes assessment** to inform teaching.

- Understand how microorganisms, plants, and animals are classified.
- Use classification keys and scientific vocabulary (e.g., vertebrates, invertebrates, fungi).

Animals, Including Humans

- Identify and name the main parts of the human circulatory system.
- Describe the functions of the heart, blood vessels, and blood.
- Recognise the impact of diet, exercise, drugs, and lifestyle on the way the body functions.
- Describe how nutrients and water are transported within animals.

Evolution and Inheritance

- Recognise that living things have changed over time and that fossils provide information about living things from the past.
- Understand that 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

- Understand that light travels in straight lines.
- Explain that objects are seen because they reflect light into the eye.
- Understand that shadows have the same shape as the objects that cast them.
- Use ray diagrams to explain how we see things.

Electricity

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells.
- Compare and give reasons for variations in how components function (e.g., brightness, loudness).
- Use recognised symbols when drawing simple circuit diagrams.

Pedagogical and Assessment Strategies

- Clear **progression from Year 4 and towards Year 6** end goals.

- **Cognitive load management** is key: use *chunked explanations*, *dual coding*, and *retrieval practice*.
- **Disciplinary knowledge** (how science works) should be taught alongside substantive content.
- Assess through **cumulative, low-stakes quizzes, formative tasks, and practical investigations**.
- Explicitly teach and use **scientific vocabulary**.
- Revisit and reinforce **key Stage 2 concepts** in preparation for transition to Key Stage 3.

Careers in Science

At Brownlow our aim is to raise aspirations and support career related learning, helping children learn about the world around them broadening their aspirations and challenging stereotypes. There are so many varied pathways to a chosen career it's important that children recognise the opportunities that are available to them.

[hashtag#startsmalldreambig](#)



Science opens the door to many exciting jobs that help us understand the world, keep people healthy, and protect our planet.



Empowered Learner

Each term the 'Empowered Learner' focus emphasises six areas of personal development. Throughout their time at Brownlow Fold all children are supported to become self-evaluative of their own strengths and areas for development. We recognise the impact that personal skills can have on the academic success and well-being of our children. They play a vital role in developing the ability of our pupils to enjoy and reflect on their learning across the curriculum.



Autumn One - Self Manager
Autumn Two - Effective Participators

Spring One - Resourceful Thinker
Spring Two - Reflective Learner

Summer One - Independent Enquirer
Summer Two - Team Worker

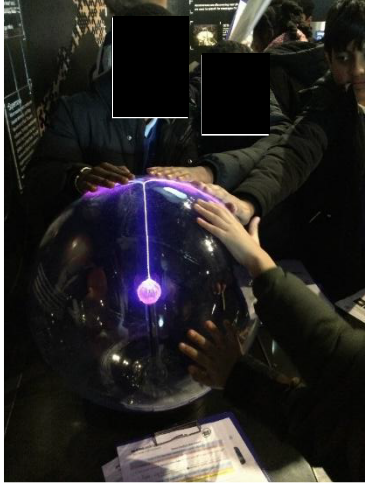
Extra-Curricular Clubs

At Brownlow Fold, we provide children with a wide range of extra-curricular activities. Extra-curricular activities help children to learn about themselves and develop and use their skills and knowledge in different contexts. In addition to building skills within a specific discipline, extracurricular activities are great for developing general academic and soft skills. For example debating for public speaking, academic competitions for exam strategies and sport for teamwork. Being part of a group or team also provides a sense of belonging, with extracurricular activities offering an opportunity for children to interact with others with similar interests and potentially build friendships outside of their usual circle.

Enrichment

Jodrell Bank Visit

Pupils visited Jodrell Bank to enhance their learning about Space in their science lessons. The visit included taking part in practical hands on investigative work: looking at interesting models, dressing up as scientists involved in the creation of the Lovell telescope, watching a movie all about the planets, sun, moon, Earth, stars, constellations and how the telescope was created.



Dental hygiene Visit to EYFS

Bolton NHS explore dental hygiene with both the Nursery and Reception children. This visit involves pupils learning about how to care for their own teeth and is always planned at the beginning of EYFS using the assisted brushing scheme to support dental hygiene in school.

Curious Critters

Year One had a very exciting visit from Curious Critters linked to their animals including humans unit of learning. They were able to use all their senses while exploring a wide range of creatures and this hands on experience enabled them to further develop their scientific vocabulary and understanding.

Community/Sensory Gardens

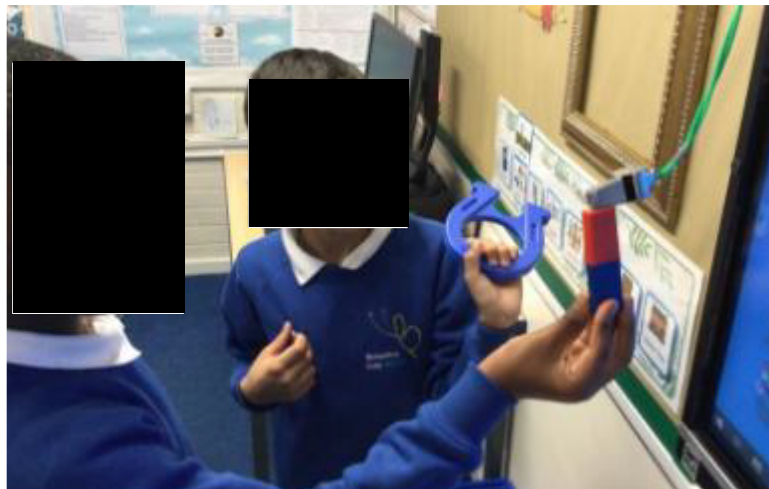
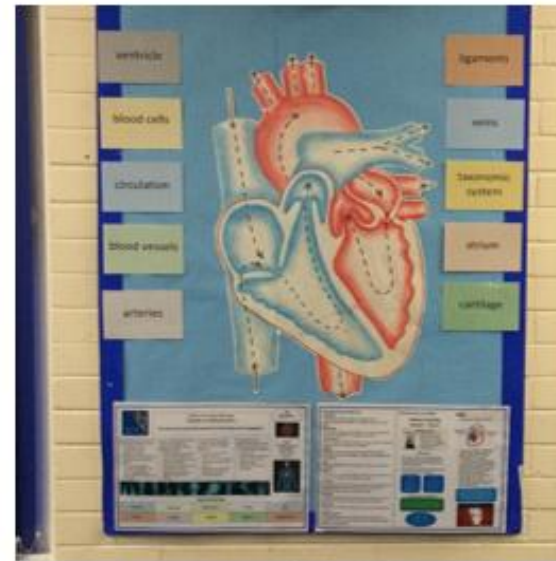
The opportunity to take our lessons outdoors is wonderful for our pupils, as they often feel less inhibited both physically and mentally, allowing them to apply their learning in a real-world context whilst opening the door to all facets of development. Our Sensory Garden benefits the children's wellbeing and also supports the curriculum – from Maths and Science to Art, Science and History. Each child at Brownlow Fold has the opportunity, throughout the year, to take part in activities to develop our Community Garden. The children learn gardening skills through planting seeds, weeding or harvesting produce. As well as this have the opportunity to sketch wildlife, understand how food goes from field to fork and learn how to attract more birds and insects into our outdoor environment. Pupils worked together to keep the weeds out of the flower beds and keep the community garden nice and tidy for people to use



Knowledge Organisers

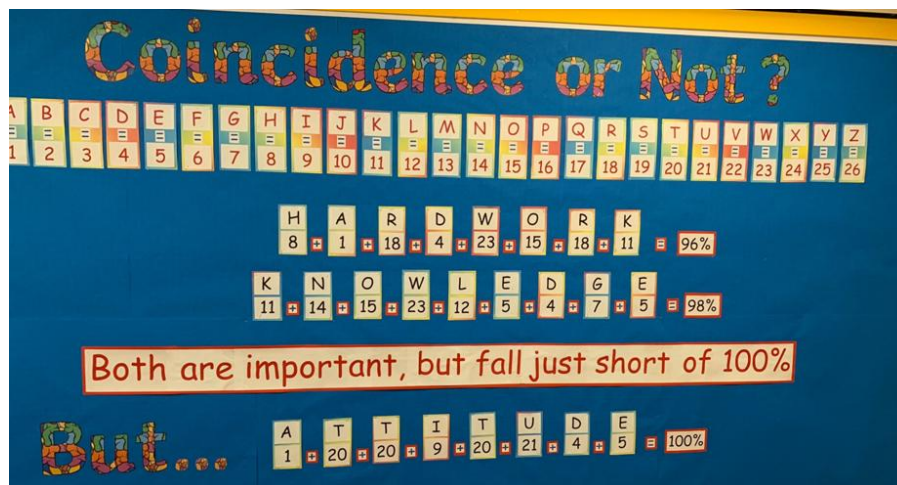
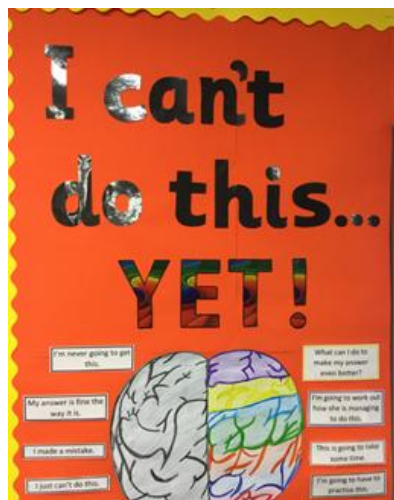
Our curriculum knowledge organisers contain key facts and information that children need to have about a topic. Our knowledge organisers include the essential facts about each topic, laid out in easy-to-digest chunks; key vocabulary or technical terms and their meanings; images such as maps or diagrams; and famous quotations, if relevant. When pupils learn, they gain and retain deeper and more sophisticated knowledge in their mental models. Developing pupil knowledge is important as the more pupils know (and the better organised their knowledge), the better they can understand a new idea (by connecting it to their existing knowledge) and the better they can solve problems (by applying their knowledge). Their existing knowledge reduces the burden on pupils' working memory.

Learning Environment Celebrating Work



Growth Mind-set

At Brownlow Fold we teach the children to love challenges, be intrigued by mistakes, enjoy effort, and keep on learning (even when they find work challenging). Adopting a Growth Mind-set approach offers an optimistic view about what is achievable for everyone at Brownlow Fold.



Brownlow Bucket List

At Brownlow Fold we have carefully designed a 'Brownlow Bucket List' to provide our pupils with a range of memorable and meaningful experiences during their time with us. Rather than being a list created individually, it is a collection of activities and opportunities chosen by the school, ensuring that every child has the chance to take part. Our aim is for pupils to leave Brownlow Fold having not only achieved academically, but also having enjoyed a wide variety of experiences that will enrich their personal growth, confidence, and sense of community. These activities include opportunities to:

- Try new challenges both in and outside of the classroom.
- Take part in cultural, creative, and sporting experiences.
- Develop life skills that will support them beyond primary school.
- Celebrate important milestones with their peers.

The Bucket List is something we want children to be proud of as they move on to the next stage of their education. Each item ticked off will represent an achievement or special memory that has shaped their journey with us.



Things to achieve before I leave...

Take part in a Forest School Workshop 	Become a pupil ambassador 	Attend the Headteacher celebration tea party 	Share and debate my views 	Try food from another country
Have my art work exhibited 	Participate in the schools linking projects with pupils from another school 	Take part in a sports competition 	Visit a place of worship 	Carry out a science experiment
Take part in Geographical field work 	Read a target amount of books each year 	Recite a poem 	Perform on stage 	Achieve an Empowered Learner Award
Achieve the Teddy Award 	Take part in the Y6 residential 	Visit a beach 	Learn to ride a bike (Bikeability) 	Help look after our school dog (Teddy)
Visit a library or museum 	Learn to swim 	Achieve the Star of the week 	Meet a member of parliament 	Raise money for charity
Plant flowers and seeds in the sensory garden 	Record an episode for the Brownlow podcast 	Take part in the Learner to Learner programme 	Find my way using a map/compass 	Take part in an extracurricular club
Meet an author 	Learn to play an instrument 	Ensure I have a Growth Mindset 	Visit an airport 	Complete a Commando Joe mission
Sing on a stage as part of choir 	Achieve the reader of the week 	Take part in the Brownlow Bake Off 	Enter a competition 	

Progression at Brownlow Fold Primary School

- Pupils revisit core ideas with increasing complexity.
- Vocabulary builds systematically.
- Connections between different science topics are made clear.
- Knowledge is applied through practical enquiry and real-world contexts.

	Year One	Year Two	Year Three	Year Four	Year Five	Year Six
Scientific Enquiry Six main areas of scientific enquiry: • Observing changes over time • Noticing patterns • Grouping and classifying things (noticing similarities and differences) • Comparative and fair testing • Finding things out using secondary sources of information (researching) • Modelling: when the teacher models a practical enquiry-based task for the pupils	▪ 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		▪ 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		▪ 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 ▪ Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs ▪ Using test results to make predictions to set up further comparative and fair tests ▪ Using simple models to describe scientific ideas ▪ Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of 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	
Making links across the curriculum	Science at Brownlow Fold is given a high priority. Our curriculum progressively builds on the children’s prior knowledge, skills and understanding and our aim is to create curriculum cohesion, enabling learners to make links to their learning appropriately across the curriculum. Within each strand of science, teachers look for opportunities for pupils to recall and revisit topics taught in the previous year group or age phase, and then apply their developing skills and knowledge to new areas of learning. Lessons and activities are planned with the purpose of maximising pupils’ thinking and reasoning skills, putting greater emphasis on learners’ own questioning. Further challenge tasks are provided which extend pupils’ enquiry-based skills and encourage pupils to explore topics in greater depth.					
Plants (Main objectives)	Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees	Observe and describe how seeds and bulbs grow into mature plants	Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers	Explore and use classification keys to help group, identify and name a variety of living	Describe the life process of reproduction in some plants	Describe how plants are classified into broad groups according to common observable characteristics and

	Identify and describe the basic structure of a variety of common flowering plants, including trees	Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy	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	things in their local and wider environment Recognise that living things can be grouped in a variety of ways		based on similarities and differences Give reasons for classifying plants and animals based on specific characteristics
Knowledge required	Pupils should: - use the local environment throughout the year to explore and answer questions about plants growing in their habitat - where possible, observe the growth of flowers and vegetables that they have planted - become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem)	Pupils should: - use the local environment throughout the year to observe how different plants grow - be introduced to the requirements of plants for germination, growth and survival - be introduced to the processes of reproduction and growth in plants - be aware that and bulbs need water to grow but most do not need light - know that seeds and bulbs have a store of food inside them	Pupils should: - be introduced to the relationship between structure and function: the idea that every part has a job to do - explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction - be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens	Pupils should: - explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation - know that plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses	Pupils should: - find out about different types of reproduction, including sexual and asexual reproduction, in plants - study and raise questions about their local environment throughout the year - observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment	Pupils should: - build on their learning about grouping living things in Year 4 by looking at the classification system in more detail - be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided - discuss reasons why living things are placed in one group and not another - find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification
Links to scientific enquiry	Teachers can help pupils: - observe closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants - describe how they were able to identify and group them, and drawing diagrams showing the parts of	Teachers can help pupils: - observe and record, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb - observe similar plants at different stages of growth	Teachers can help pupils: - compare the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser - discover how seeds are formed by observing the different stages of plant life cycles over a period of time	Teachers can help pupils: - use and make simple guides or keys to explore and identify local plants - make a guide to local living things	Teachers can help pupils: - observe and compare the life cycles of plants in their local environment with other plants around the world (in the rainforest, in the oceans, in desert) - grow new plants from different parts of the parent plant, for example, seeds,	Teachers can help pupils: - use classification systems and keys to identify some plants in the immediate environment - research unfamiliar plants from a broad range of other habitats and decide where they belong in the classification system

	different plants including trees ▪ keep records of how plants have changed over time, for example the leaves falling off trees and buds opening ▪ compare and contrast what they have found out about different plants	▪ set up a comparative test to show that plants need light and water to stay healthy	▪ look for patterns in the structure of fruits that relate to how the seeds are dispersed ▪ observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observe how water travels up the stem to the flowers		stem and root cuttings, tubers, bulbs	
Animals, including humans (Main objectives)	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)	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	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	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	Describe the changes as humans develop to old age	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
Knowledge required	Pupils should: ▪ use the local environment throughout the year to explore and answer questions about animals in their habitat ▪ understand how to take care of animals taken from their local environment and the need to return them safely after study ▪ become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets	Pupils should: ▪ be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans ▪ be introduced to the processes of reproduction and growth in animals ▪ form questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs ▪ learn new vocabulary: egg, chick, chicken, caterpillar, pupa, butterfly, spawn, tadpole, frog, lamb, sheep. Growing into adults can include reference to baby,	Pupils should: ▪ continue to learn about the importance of nutrition ▪ be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions	Pupils should: ▪ be introduced to the main body parts associated with the digestive system, for example, mouth, tongue, teeth, oesophagus, stomach and small and large intestine ▪ explore questions that help them to understand their special functions	Pupils should: ▪ draw a timeline to indicate stages in the growth and development of humans ▪ learn about the changes experienced in puberty ▪ compare the changes that happen during puberty between boys and girls	Pupils should: ▪ build on their learning from Years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function ▪ learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body

		toddler, child, teenager, adult				
Links to scientific enquiry	Teachers can help pupils: - use their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them - group animals according to what they eat - use their senses to compare different textures, sounds and smells	Teachers can help pupils: - observe, through video or first-hand observation and measurement, how different animals, including humans, grow - ask questions about what things animals need for survival and what humans need to stay healthy - suggest ways to find answers to their questions	Teachers can help pupils: - identify and group animals with and without skeletons and observing and comparing their movement - explore ideas about what would happen if humans did not have skeletons - compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat - research different food groups and how they keep us healthy and design meals based on what they find out	Teachers can help pupils: - compare the teeth of carnivores and herbivores, and suggesting reasons for differences - find out what damages teeth and how to look after them - draw and discuss their ideas about the digestive system and compare them with models or images	Teachers can help pupils: - research the gestation periods of other animals and compare them with humans - find out and recording the length and mass of a baby as it grows	Teachers can help pupils: explore the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health
Living things and their habitats (Main objectives)	Identify the habitats of a variety of common animals that are carnivores, herbivores and omnivores Describe and compare the habitats of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) Observe changes across the four seasons and how hibernation links to seasonal changes	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 micro-habitats 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	Identify that animals, including humans, need protection from the elements Describe the essential features common to all habitats Describe the habitats of different groups of animals dependent on where in the world they live Explore the habitats of different groups of people dependent on where in the world they live	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	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 animals	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

Knowledge required	Pupils should: - be introduced to the term 'habitat' (a natural environment or home of a variety of plants and animals) - use the local environment throughout the year to explore and answer questions about animals in their habitat - understand how to take care of animals taken from their local environment and the need to return them safely after study - become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets - observe and talk about changes in the weather and the seasons - gain an understanding of hibernation	Pupils should: - be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy - raise and answer questions that help them to become familiar with the life processes that are common to all living things - be introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter) - raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals - compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest	Pupils should: - explore questions that focus on the requirements of plants for life and growth - know that all living things have certain characteristics that are essential for keeping them alive and healthy - compare the habitats of animals in the local environment with the homes of people (pupils) in the local community - know that essential elements must be present to provide a viable habitat - know the three main habitat groups: terrestrial habitats (grasslands, savannahs and prairies, tropical rainforests, deserts, and mountains); freshwater habitats (rivers and streams, lakes and ponds, wetlands, and brackish water); marine habitats (open ocean, and coral reefs) - examine the habitats (homes) of different groups of people, according to where in the world they live, for example, next to the ocean, in the rainforest, in the Arctic Circle, in the deserts of Mexico	Pupils should: - use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat - identify how the habitat changes throughout the year - explore possible ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants - begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects - group plants into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses - explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation	Pupils should: - find out about different types of reproduction, including sexual reproduction in animals - observe and compare life-cycle changes in a variety of living things, such as animals in the local environment with other animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times) - find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall - asking pertinent questions and suggesting reasons for similarities and differences	Pupils should: - build on their learning about grouping living things in year 4 by looking at the classification system in more detail - be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided - through direct observations where possible, classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals) - discuss reasons why living things are placed in one group and not another - find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification
Links to scientific enquiry	Teachers can help pupils: use their observations to compare and contrast animals' homes at first hand or through videos and photographs	Teachers can help pupils: sort and classify things according to whether they are living, dead or were never alive, and recording their findings using charts	Teachers can help pupils: - group people according to where they live - create a map of the 'habitats' of different groups of people around the world	Teachers can help pupils: - use and make simple guides or keys to explore and identify local plants and animals - make a guide to local living things	Teachers can help pupils: observe and compare the life cycles of animals in their local environment with other animals around the world (in the rainforest, in the oceans, in desert)	Teachers can help pupils: - use classification systems and keys to identify some animals and plants in the immediate environment - research unfamiliar animals and plants from a broad

	▪ group animals according to where they live ▪ make tables and charts about the weather	▪ describe how they decided where to place things, exploring questions for example: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions ▪ construct a simple food chain that includes humans (e.g. grass, cow, human)	▪ group a range of different habitats according to the main three types: terrestrial, freshwater and marine ▪ explain how they know that there are five essential elements which must be present to provide a viable habitat: food, water, cover, space, and arrangement	▪ raise and answer questions based on their observations of animals and what they have found out about other animals that they have researched	▪ compare how different animals reproduce and grow	range of other habitats and decide where they belong in the classification system
Materials & States of Matter (Main objectives)	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	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	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	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	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	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

					reversible, including changes associated with burning and the action of acid on bicarbonate of soda	
Knowledge required	Pupils should: - explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent - explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil	Pupils should: - identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass) - think about the properties of materials that make them suitable or unsuitable for particular purposes - be encouraged to think about unusual and creative uses for everyday materials - find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam	Pupils should: - explore different kinds of rocks and soils, including those in the local environment, linking with work in science - classify rocks according to whether they have grains or crystals, and whether they have fossils in them - investigate what happens when rocks are rubbed together or what changes occur when they are in water	Pupils should: - explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container) - observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled - begin to know that some materials, when heated, result in chemical changes, for example, through baking or burning (irreversible changes)	Pupils should: - build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in Year 3 and about electricity in Year 4 - explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes - explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda - find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton	Pupils should: - find out more about how living things on earth have changed over time - be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles - appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox - find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution - not be expected to understand how genes and chromosomes work at this stage
Links to scientific enquiry	Teachers can help pupils: perform simple tests to explore questions, for example: 'What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?'	Teachers can help pupils: compare the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs)	Teachers can help pupils: - observe rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time - use a hand lens or microscope to help them to identify and classify rocks according to whether they	Teachers can help pupils: - group and classify a variety of different materials - explore the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party)	Teachers can help pupils: carry out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?'	Teachers can help pupils: - observe and raise questions about local animals and how they are adapted to their environment - compare how some living things are adapted to survive in extreme conditions, for example,

		observe closely, identifying and classifying the uses of different materials, and recording their observations	have grains or crystals, and whether they have fossils in them - research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed - explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water - raise and answer questions about the way soils are formed	- research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid - observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting	- compare materials in order to make a switch in a circuit - observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes - research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials	cactuses, penguins and camels analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers
Our Senses, including Light & Sound (Main objectives)	Observe and describe weather associated with the seasons and how day length varies Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense	Explain their understanding of the five senses, as well as the experience of sensing temperature Identify and compare the texture of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard Observe and describe a variety of everyday objects with regard to what they look like, sound like, feel like, etc. Compare and contrast the smells and tastes of different everyday foods with a focus on sweet, savoury and sour	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.	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	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 Understand that shadows are created when objects block the path of light at an immense scale	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
Knowledge required	Pupils should: observe and talk about changes in the weather and the seasons	Pupils should: know all five senses (sight, hearing, touch, smell and taste)	Pupils should: explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror	Pupils should: explore and identify the way sound is made through vibration in a range of different musical	Pupils should: be introduced to a model of the Sun and Earth that enables them to explain day and night	Pupils should: build on the work on light in Year 3 and Year 5, exploring the way that light behaves,

	- understand that light comes from the Sun; when it is daytime, the light comes from the Sun - know that the sun is a light source, but the moon is not - learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes	- understand that the experience of sensing temperature isn't classified as one of the main five senses, but it is considered an additional sense - understand that when one of our senses stops working, the other senses become heightened (stronger)	games to help them to answer questions about how light behaves - think about why it is important to protect their eyes from bright lights - look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change	instruments from around the world find out how the pitch and volume of sounds can be changed in a variety of ways	- learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006) - understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones) - understand the concept of a solar eclipse and a lunar eclipse	including light sources, reflection and shadows talk about what happens and make predictions
Links to scientific enquiry	Teachers can help pupils: - make displays of what happens in the world around them, including day length, as the seasons change - describe and compare different light sources - use their senses to compare different textures, sounds and smells	Teachers can help pupils: - observe closely different objects and record their observations with regard to what it looks like, what it sounds like, what it feels like, etc. - carry out food tasting activities and identifying flavours and textures - carry out practical tasks where pupils have had one of their senses taken away (e.g. ears blocked trying to lip read; eyes covered and navigating across a room, following instructions) - research different ingredients and recipes with a focus on sweet, savoury and sour	Teachers can help pupils: look for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes	Teachers can help pupils: - find patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses - make earmuffs from a variety of different materials to investigate which provides the best insulation against sound - make and play their own instruments by using what they have found out about pitch and volume	Teachers can help pupils: - compare the time of day at different places on the Earth through internet links and direct communication - create simple models of the solar system - construct simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day - find out why some people think that structures such as Stonehenge might have been used as astronomical clocks - research the different types of solar and lunar eclipse (total, partial and annular)	Teachers can help pupils: - decide where to place rear-view mirrors on cars - design and make a periscope and using the idea that light appears to travel in straight lines to explain how it works - investigate the relationship between light sources, objects and shadows by using shadow puppets - extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur)
Forces, Magnets and Electricity (Main objectives)	Identify the three forces of push, pull and twist, and explore these actions in everyday use Identify and locate everyday objects and appliances that rely on magnets to function	Identify the force of air resistance and explore this action in everyday use Identify the force of water resistance and explore this action in everyday use	Compare how things move on different surfaces Notice that some forces need contact between two objects, but magnetic forces can act at a distance	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	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	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

	Identify and locate electricity-powered objects and appliances within school and at home	Recognise that balanced forces are equal and go in opposite directions	Observe how magnets attract or repel each other and attract some materials and not others Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials Describe magnets as having two poles Predict whether two magnets will attract or repel each other, depending on which poles are facing	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	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	loudness of buzzers and the on/off position of switches Use recognised symbols when representing a simple circuit in a diagram
Knowledge required	Pupils should: - explore the three forces of push, pull and twist in everyday use - identify the use of magnets in and around the school and home - be taught about electricity-powered objects and appliances within school and at home	Pupils should: - observe the force of air resistance in action and explore this in everyday use - explore how the shapes of objects made from different materials can affect whether it floats or sinks in water - label simple diagrams showing balanced forces in action	Pupils should: - observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing) - explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe)	Pupils should: - construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices - draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage (these will be introduced in Year 6) - use the terms current and voltage, but these should not be introduced or defined formally at this stage - be taught about precautions for working safely with electricity	Pupils should: - explore falling objects and raise questions about the effects of air resistance - explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall - experience forces that make things begin to move, get faster or slow down - explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel - explore the effects of levers, pulleys and simple machines on movement - find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation	Pupils should: - build on the work previously taught in Year 4 - construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors - learn how to represent a simple circuit in a diagram using recognised symbols - learn only about series circuits, not parallel circuits - be taught to take the necessary precautions for working safely with electricity

Links to scientific enquiry	Teachers can help pupils: ▪ design and make a Lego vehicle that requires the forces of push, pull and twist in order to operate ▪ look for everyday objects and appliances that rely on magnets to function within the school building ▪ group electricity-powered appliances within school and at home according to being mains or battery operated	Teachers can help pupils: ▪ design and make a kite that requires air resistance in order to function ▪ explore why some objects float in water with regard to gravity and up-thrust ▪ group objects/vehicles that rely on wind to move	Teachers can help pupils: ▪ compare how different things move and grouping them ▪ raise questions and carry out tests to find out how far things move on different surfaces and gathering and recording data to find answers their questions ▪ explore the strengths of different magnets and finding a fair way to compare them ▪ sort materials into those that are magnetic and those that are not ▪ look for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another ▪ identify how these properties make magnets useful in everyday items and suggesting creative uses for different magnets	Teachers can help pupils: ▪ observe patterns, for example, that bulbs get brighter if more cells are added ▪ identify metals that tend to be conductors of electricity, and find out that some materials can and some cannot be used to connect across a gap in a circuit	Teachers can help pupils: ▪ explore falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective ▪ explore resistance in water by making and testing boats of different shapes ▪ design and make products that use levers, pulleys, gears and/or springs and explore their effects	Teachers can help pupils: ▪ systematically identifying the effect of changing one component at a time in a circuit ▪ designing and making a set of traffic lights, a burglar alarm or some other useful circuit
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