Science at Claycots

Claycots Primary School

www.claycots.co.uk
Town Hall Campus: 01753 531415
Britwell Campus: 01753 521215

Science Team

Mrs Ali is our Science Leader at Claycots

The vision for Science

At Claycots, we aim to inspire pupils by providing hands-on learning experiences to foster their natural curiosity and a lifelong love for scientific enquiry. Our curriculum aspires to empower pupils with the knowledge and skills to understand the uses and implications of science, today and for the future.

How our curriculum delivers the vision

- Every unit is built around practical, hands-on enquiry, with an exploratory activity at its heart.
- Knowledge, working scientifically skills and vocabulary are sequenced from the EYFS to Year 6 so that each unit builds on what came before and is retrieved afterwards.
- Scientist studies, enrichment and climate change links make the uses and implications of science real for pupils.

Our principles for Science

Science is good at Claycots when…

Ask questions

Pupils ask questions and develop their natural curiosity about scientific concepts.

Independent choices

Pupils make independent choices for scientific enquiry.

Wide range of resources

Pupils use a wide range of resources: practical activities, videos and real-life images.

Real-life links

Pupils make real-life links to understand the implications of science in their lives.

Scientific vocabulary

Pupils discuss their learning using scientific vocabulary.

Knowledge and skills

Pupils progress in their scientific knowledge and skills.

Enrichment

Pupils take part in a variety of enrichment activities.

Subject Intent

At Claycots we want children to think like scientists through a hands-on, creative and purposeful curriculum which ignites a sense of awe and wonder. As a school, we recognise that science has changed our lives and plays a vital role in the world's future prosperity and our science curriculum should develop children's scientific understanding of the natural world by making meaningful links to real life contexts, whilst enhancing working scientifically skills. We want them to aspire to become astronomers, botanists, chemists, cytologists and have no limits to their ambitions for a STEM career.

As a school, we teach the National Curriculum for science and aim to ensure that all pupils:

Knowledge

develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics

Working scientifically

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

Uses and implications

are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

Subject Implementation

At Claycots, teachers use our own schemes of learning for every unit from Year 1 to Year 6. These are drawn together in our whole-school Science Progression Document, which sequences knowledge, working scientifically skills and vocabulary from the EYFS (Nursery and Reception) to Year 6, so that pupils know and remember more over time. Every unit is built around practical, hands-on enquiry.

Central to our approach is the teaching of the six types of scientific enquiry, identified and sequentially planned for across the curriculum:

- **Observing over time**
- **Comparative testing**
- **Fair testing**
- **Identifying and classifying**
- **Pattern seeking**
- **Research using secondary sources**

Teaching follows the Claycots Principles for teaching and learning: modelling, questioning, checking for understanding, oracy and vocabulary, adaptations and securing retention.

Subject Implementation

Every science lesson follows a consistent structure:

1. **Retrieval quiz**
   Last lesson, last unit, last term and last year, so learning is revisited and remembered
2. **Enquiry question**
   Each lesson is framed around a question; each unit opens with a knowledge harvest
3. **Explicit teaching**
   New knowledge and skills are modelled; new vocabulary is taught with visuals
4. **Exploratory activity**
   Hands-on enquiry with clear ways to record findings
5. **Plenary**
   Checking understanding and addressing misconceptions before moving on

Our schemes of learning were planned with a science consultant alongside the year group leaders, using the National Curriculum and our whole school progression document as the starting point. Each scheme sets out the learning intention, National Curriculum links, working scientifically skills, resources, recording, common misconceptions and SEND adaptations for every lesson. The team meets termly to review the previous term's plans, compare actual outcomes against the planned opportunities and refine the schemes, so that the school has full curriculum coverage and the science curriculum is regularly reviewed to ensure we are providing the best for pupils at Claycots.

Subject Overview

Year group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	**Animals Including Humans** *Identifying & classifying; Pattern seeking*		**Everyday Materials** *Identifying & classifying; Comparative testing* Scientist study: Charles Macintosh		**Plants** *Observing over time; Identifying & classifying* ★ Climate change link	
Year 2	**Living Things and Their Habitats** *Identifying & classifying; Pattern seeking* ★ Climate change link		**Uses of Everyday Materials** *Comparative testing; Identifying & classifying* Scientist study: John Dunlop	**Plants** *Observing over time; Pattern seeking*	**Animals Including Humans** *Pattern seeking; Research*	
Year 3	**Animals Including Humans** *Research; Identifying & classifying*	**Forces and Magnets** *Comparative testing; Pattern seeking*	**Rocks** *Identifying & classifying; Comparative testing* Scientist study: Mary Anning ★ Climate change link	**Light** *Pattern seeking; Comparative testing*	**Plants** *Fair testing; Observing over time* ★ Climate change link	
Year 4	**States of Matter** *Observing over time; Comparative testing* ★ Climate change link	**Animals Including Humans** *Research; Identifying & classifying*	**Electricity** *Comparative testing; Identifying & classifying*	**Sound** *Pattern seeking; Comparative testing*	**Living Things and Their Habitats** *Identifying & classifying; Observing over time* Scientist study: Jane Goodall ★ Climate change: explicit	
Year 5	**Earth and Space** *Research; Observing over time* Scientist study: Maggie Aderin-Pocock	**Living Things and Their Habitats** *Pattern seeking; Research* ★ Climate change link	**Properties and Changes of Materials** *Fair testing; Identifying & classifying* Scientist study: Spencer Silver & Arthur Fry ★ Climate change link		**Forces** *Fair testing; Pattern seeking* Scientist study: Galileo Galilei	
Year 6	**Animals Including Humans** *Fair testing; Pattern seeking* Scientist study: Santorio Santorio	**Evolution and Inheritance** *Research; Pattern seeking* Scientist study: Charles Darwin ★ Climate change link	**Electricity** *Fair testing; Comparative testing* Scientist study: Michael Faraday	**Light** *Pattern seeking; Fair testing*	**Living Things and Their Habitats** *Identifying & classifying; Research* ★ Climate change link	**Independent Science Enquiry and Science Fair** *All enquiry types* Science Fair for parents at Townhall and Britwell

Working Scientifically: Enquiry Types

Enquiry type	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Identifying and classifying	Sorting and matching natural objects, materials and toy animals	Animals and everyday materials	Living, dead and never alive; habitats	Rocks and skeletons	Classification keys; solids, liquids and gases	Properties of materials	Linnaean classification and micro-organisms
Comparative testing	Play-based comparisons (which boat floats, which car rolls furthest)	Absorbency; floating and sinking	Best material for a purpose	Friction on surfaces; rock hardness; reflective surfaces	Conductors and insulators; evaporation rates	Comparative tests within fair testing	Comparative tests within fair testing
Fair testing	Precursors through simple and comparative tests	Precursors through simple tests	Precursors through comparative tests	Introduced: what plants need to grow	Sound and electricity, one variable changed	Rate of dissolving, gravity, air resistance, friction, with repeat readings	Voltage and brightness; shadow size; exercise and heart rate
Pattern seeking	Noticing patterns and change: seasons, shadows, repeating patterns	Handprints high	Taller people, longer arms?	Shadow size and distance; magnet poles	Pitch and volume	Gestation and size (scatter graphs, correlation)	Heart rate; offspring and inheritance
Observing over time	Growing seeds; life cycles; melting ice; seasons	Seasons; plants in the dark	Seeds and bulbs growing	Celery water transport; soil settling	Evaporation; egg-shell decay; habitats changing	Shadow clock; cuttings	Micro-organisms
Research	Non-fiction books and ‘why’ questions	Scientist stories: Charles Macintosh	Scientist stories: John Dunlop	Skeleton functions; Mary Anning	Jane Goodall; human impact on environments	Gravity and air resistance; naturalists	Darwin, Faraday; diet and lifestyle

Scientist Study Across the School

Each year group studies significant scientists linked to the units taught, so that pupils see how scientific knowledge is built through evidence and enquiry and meet a range of role models.

Year	Scientist(s)	Curriculum link	Key question
Year 1	**Charles Macintosh**	Everyday Materials	*How did Charles Macintosh change everyday materials to make them more waterproof?*
Year 2	**John Dunlop**	Uses of Everyday Materials	*How did John Dunlop create a new material?*
Year 3	**Mary Anning**	Rocks and soil	*Who was Mary Anning, and how did her discoveries help us understand fossils?*
Year 4	**Jane Goodall**	Living Things and Their Habitats	*How can we encourage local wildlife onto our school grounds?*
Year 5	**Maggie Aderin-Pocock; Spencer Silver and Arthur Fry; Galileo Galilei**	Earth and Space; Properties and Changes of Materials; Forces	*How do scientists use evidence from investigations to explain the world and invent new things?*
Year 6	**Santorio Santorio; Charles Darwin; Michael Faraday**	Animals Including Humans; Evolution and Inheritance; Electricity	*How did these scientists use careful measurement, observation and evidence to change what we know?*

How we measure progress

At Claycots, we measure progress in Science using a range of methods, including:

In every lesson

A retrieval quiz at the start of each lesson (last lesson, last unit, last term, last year) shows what has been remembered. Specific and targeted questioning, whole-class responses and observation of pupils' contributions to practical activities check understanding against the learning intention, and misconceptions are addressed as they arise.

At the end of every unit

Marking of written work in pupils' books against the learning intention and success criteria. A mini end of unit quiz with four knowledge-based questions and one scenario-based question linked to an enquiry skill. In Years 5 and 6, a TAPS assessment of working scientifically at the end of each unit.

Across the year

Termly Headstart assessments in Year 6. The 'last year' retrieval question is used as a pre-assessment before a new unit, and dormant topics are deliberately revisited. We track pupils' developing knowledge and enquiry skills throughout the year to assess whether they have met the expected standard at the end of each academic year.

Enrichment, visits and experiences

At Claycots, we enrich our Science curriculum with hands-on practical lessons, visits, visitors and in-school experiences for every year group.

Year 1

Termly seasonal walks in the school grounds; growing plants from seed.

Year 2

Minibeast and microhabitat fieldwork in the school grounds.

Year 3

Flower dissection and plant growing across the Summer term.

Year 4

Climate change VR workshop; local wildlife action project (bug hotels, feeders, planting).

Year 5

Visiting planetarium; pupils present an enquiry at the whole-school Science Fair.

Year 6

Heart dissection workshop; three-week Independent Science Enquiry and Science Fair for parents at Townhall and Britwell.

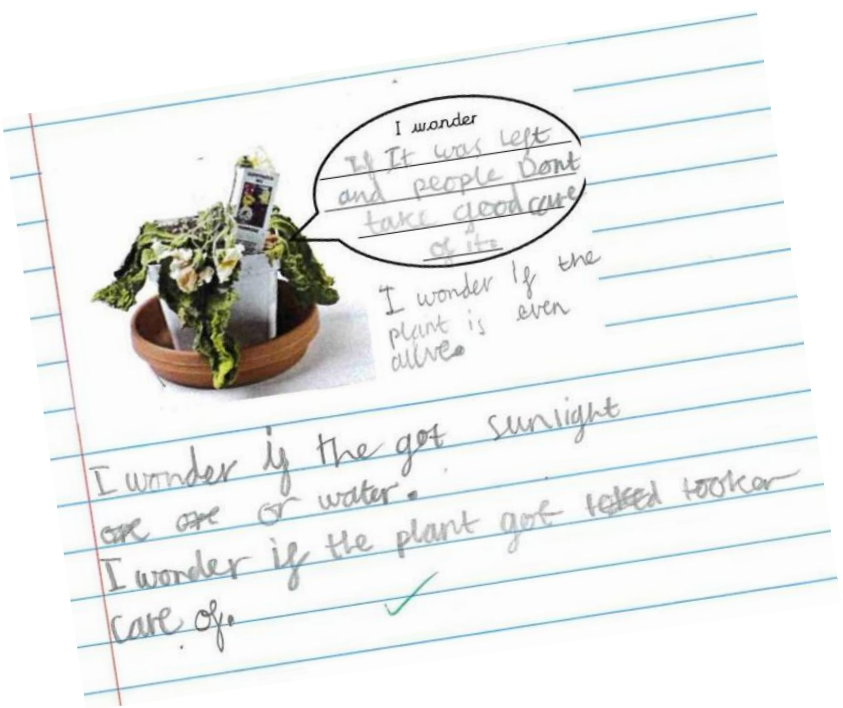
British Science Week: a whole school themed day across both campuses every Spring, based on the national theme. The Science Fair in Summer brings parents into school at both campuses.

Climate change and sustainability

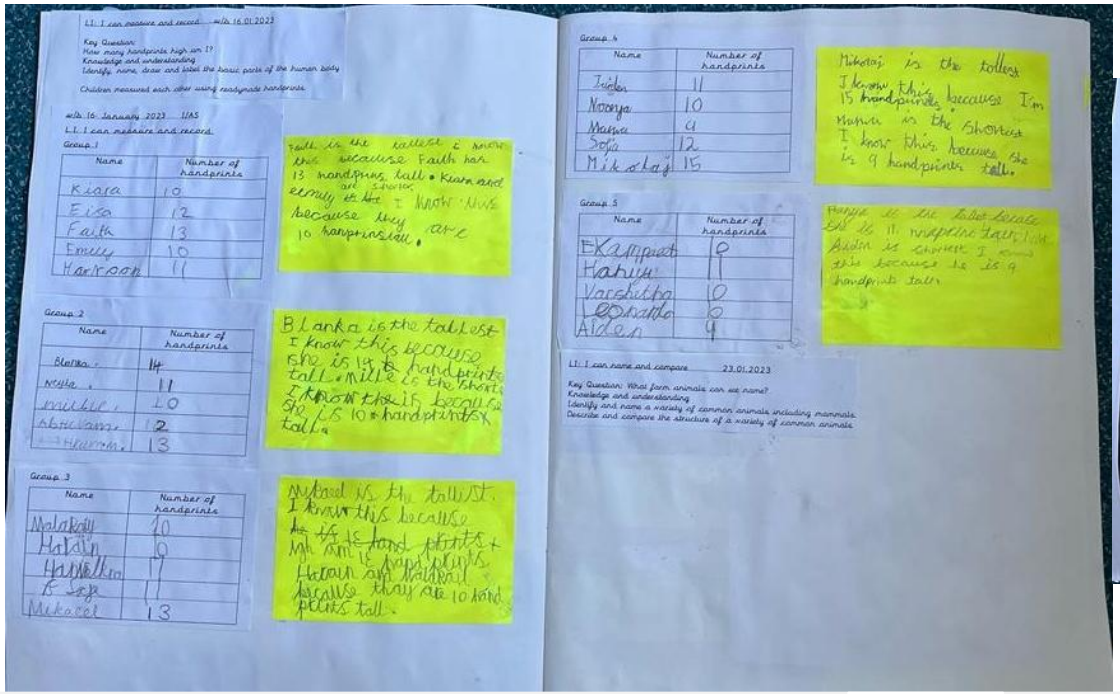
Reflecting the strengthened emphasis on climate change and sustainability in the national curriculum, pupils learn about the changing environment and what we can all do about it in every year group.

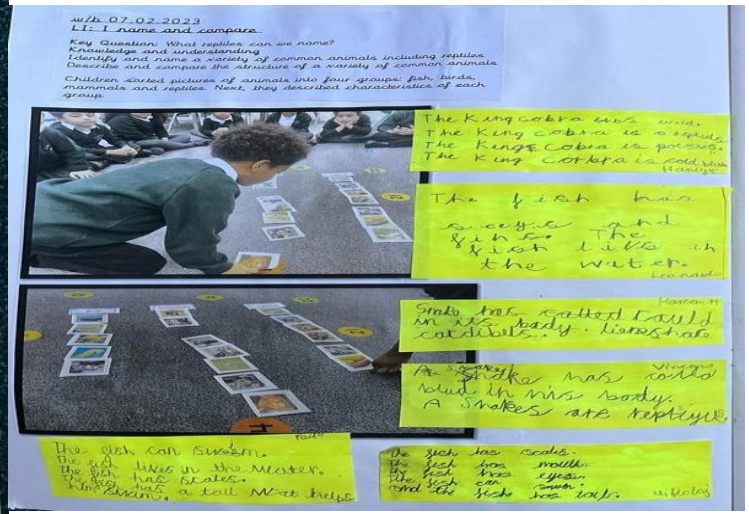
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Observing weather and seasonal change over the year; what plants need and how the seasons affect them.	Habitats provide for the basic needs of living things and living things depend on each other; the Sun as the source of energy for every food chain.	What plants need to grow well; soils are made from rocks and organic matter and are vital for life.	Explicit climate change unit: environments change and this can endanger living things; deforestation, pollution and climate change; climate change VR workshop and the Jane Goodall study; helping local wildlife.	Naturalists and conservation; life cycles of plants and animals under threat; irreversible changes including burning; the Earth as a planet in the solar system.	Adaptation and what happens when environments change faster than species can adapt; biodiversity and classification; pupils' own Science Fair enquiries can address local environmental questions.

Examples of learning

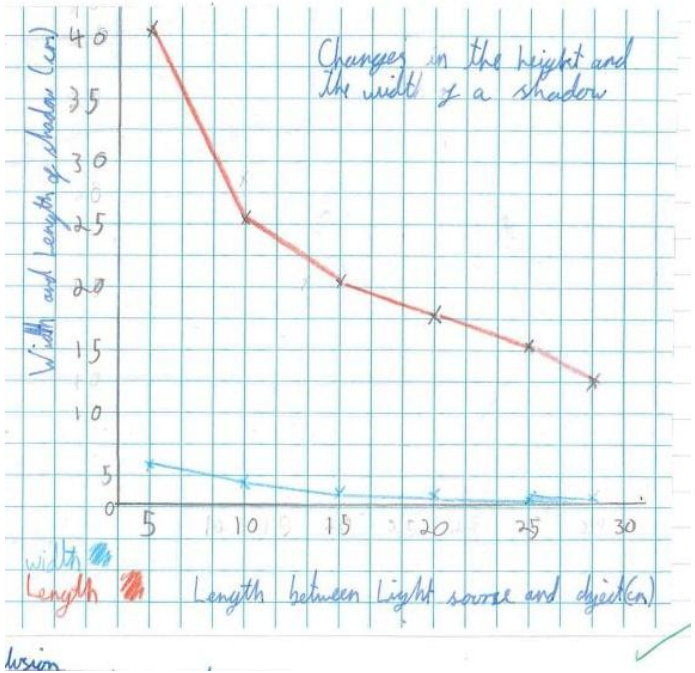


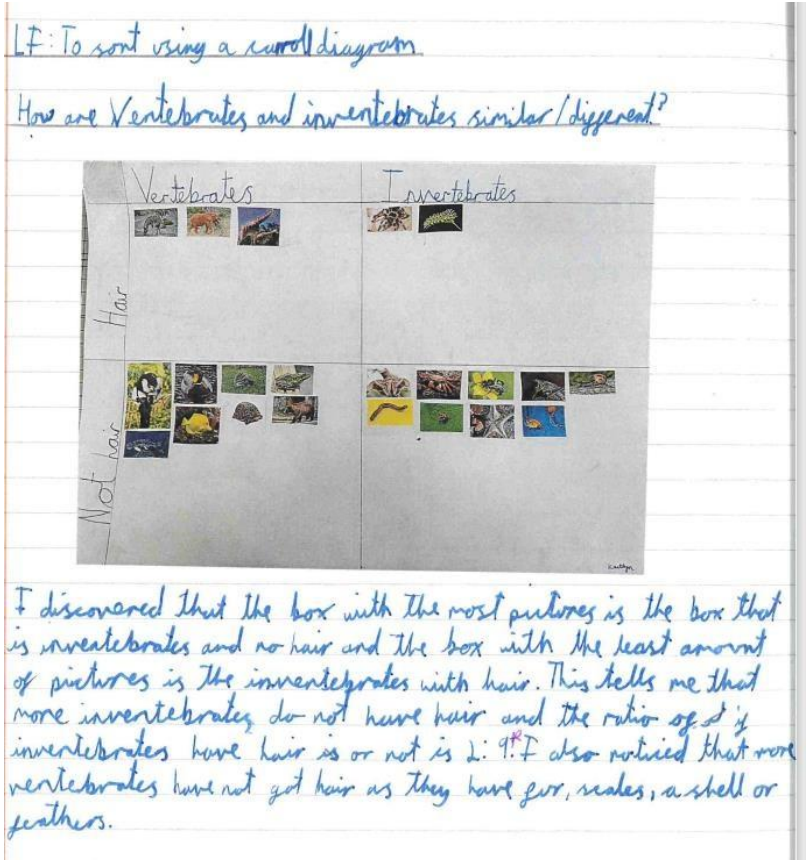
Examples of learning





Examples of learning




LI: To sort using a carroll diagram

How are Vertebrates and invertebrates similar/different?

I discovered that the box with the most pictures is the box that is invertebrates and no hair and the box with the least amount of pictures is the invertebrates with hair. This tells me that more invertebrates do not have hair and the ratio of if invertebrates have hair is or not is 2: 9. I also noticed that more vertebrates have not got hair as they have fur, scales, a shell or feathers.

Examples of learning

LI: To report and present findings.

What happens if moths are not camouflaged in their environments?

Moth number	Distance away from where it is no longer seen
1	5m
2	3m 5cm
3	6 m cm
4	5m 60cm
5	7m 40cm

Moth number	Distance away from where it is no longer seen
1	5m
2	3m 5cm
3	6 m cm
4	5m 60cm
5	7m 40cm

Today we will had / test tested the effectiveness of the moths camouflage from an environment. We had will measure measured the distance from the environment were it won't could nd be seen. We had will use used a metre stick to measure and use used a colouring pencil and Moth m template to create the camoflaage. The moths is was something that will changed changg. and the measuring device and environment will stay the same. The smaller the distance from the environment the better the camoflauge and the larger the distance from the environment environmnent the more uneffective the camoflauge.

If moths no longer camoflauged then their predator would eat them and moths would be extind.

Pupil voice

“I really like our nature topic. It helps us understand how to look after things.” *- Y2 pupil*

“Science is great because we see how things work and it makes us curious about the world.” *- Y2 pupil*

“I liked when we made healthy fruit kebabs. Bananas are my favourite!” *- Y2 pupil*

“The teachers help us and they always get different children to help with different jobs.” *- Y4 pupil*

“We get to do lots of hands-on experiments. I like when we make a mess and have to tidy up afterwards!” *- Y4 pupil*

Our whole-school Science Progression Document

EYFS to Year 6

- Vision and principles
- Whole school curriculum map
- Progression of working scientifically skills and enquiry types
- Progression of knowledge and vocabulary: Biology, Chemistry and Physics
- Scientist study, enrichment and climate change links
- Retrieval and assessment
- The Claycots Principles in Science

Contents

1. Vision and principles

Our vision

At Claycots, we aim to inspire pupils by providing hands-on learning experiences to foster their natural curiosity and a lifelong love for scientific enquiry. Our curriculum aspires to empower pupils with the knowledge and skills to understand the uses and implications of science, today and for the future.

Principles

Pupils **ask questions** and develop their natural curiosity about scientific concepts.

Pupils make **independent choices** for scientific enquiry.

Pupils use a **wide range of resources** to enhance their learning through practical activities, videos and real-life images.

Pupils make **real-life links** to understand the implications of science in their lives.

Pupils discuss their learning using **scientific vocabulary**.

Pupils progress in their **scientific knowledge and skills**.

Pupils take part in a variety of **enrichment activities**.

2. Whole school curriculum map

Units by half term, with enquiry focus, scientist study and climate change links. The row beneath each year shows the prior learning each unit builds on.

Year group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	**Animals Including Humans** *(Identifying & classifying; Pattern seeking)*		**Everyday Materials** *(Identifying & classifying; Comparative testing)* Scientist study: Charles Macintosh		**Plants** *(Observing over time; Identifying & classifying)* ★ Climate change link	
	EYFS link: name and describe people who are familiar to them; explore the natural world; talk about animals they have seen.		*EYFS link: explore natural materials, noticing their textures and how they change.*		*EYFS link: explore the natural world around them; understand the effect of changing seasons on plants.*	
Year 2	**Living Things and Their Habitats** *(Identifying & classifying; Pattern seeking)* ★ Climate change link		**Uses of Everyday Materials** *(Comparative testing; Identifying & classifying)* Scientist study: John Dunlop	**Plants** *(Observing over time; Pattern seeking)*	**Animals Including Humans** *(Pattern seeking; Research)*	
	Y1 link: identify and name common animals; identify and name common wild and garden plants; seasonal changes.		*Y1 link: identify and name everyday materials; describe and group by simple physical properties.*	*Y1 link: identify the basic structure of common flowering plants; observe seeds and plants over time.*	*Y1 link: identify and name common animals and their groups; name basic parts of the human body and the senses.*	
Year 3	**Animals Including Humans** *(Research; Identifying & classifying)*	**Forces and Magnets** *(Comparative testing; Pattern seeking)*	**Rocks** *(Identifying & classifying; Comparative testing)* Scientist study: Mary Anning ★ Climate change link	**Light** *(Pattern seeking; Comparative testing)*	**Plants** *(Fair testing; Observing over time)* ★ Climate change link	
	Y2 link: basic needs for survival; importance of exercise, food and hygiene; offspring grow into adults.	*Y2 link: shapes of solid objects can be changed by squashing, bending, twisting and stretching (pushes and pulls).*	*Y2 link: identify and compare the suitability of everyday materials including rock and brick.*	*Y1 link: seasonal changes – day length and the Sun; EYFS link: explore light and dark.*	*Y2 link: seeds and bulbs grow into mature plants; plants need water, light and a suitable temperature.*	
Year 4	**States of Matter** *(Observing over time; Comparative testing)* ★ Climate change link	**Animals Including Humans** *(Research; Identifying & classifying)*	**Electricity** *(Comparative testing; Identifying & classifying)*	**Sound** *(Pattern seeking; Comparative testing)*	**Living Things and Their Habitats** *(Identifying & classifying; Observing over time)* Scientist study: Jane Goodall ★ Climate change: explicit	
	Y2 link: uses of everyday materials and changing shape; Y1 link: seasonal changes and weather.	*Y3 link: nutrition, skeletons and muscles; Y2 link: food chains and basic needs.*	*EYFS link: explore how things work; Y2 link: materials and their properties.*	*Y1 link: the senses – hearing and the ear.*	*Y2 link: living, dead and never alive; habitats and microhabitats; food chains. Y3 link: plants and their needs.*	
Year 5	**Earth and Space** *(Research; Observing over time)* Scientist study: Maggie Aderin-Pocock	**Living Things and Their Habitats** *(Pattern seeking; Research)* ★ Climate change link	**Properties and Changes of Materials** *(Fair testing; Identifying & classifying)* Scientist study: Spencer Silver & Arthur Fry ★ Climate change link		**Forces** *(Fair testing; Pattern seeking)* Scientist study: Galileo Galilei	
	Y1 link: seasonal changes and day length; Y3 link: light, shadows and the Sun.	*Y4 link: classification and habitats changing; Y3 link: life cycle of flowering plants, pollination and seed dispersal.*	*Y4 link: states of matter, melting, evaporation and condensation; Y3 link: rocks and their properties.*		*Y3 link: forces and magnets – friction on different surfaces, contact and non-contact forces.*	
Year 6	**Animals Including**	**Evolution and Inheritance**	**Electricity**	**Light**	**Living Things and Their**	**Independent Science Enquiry**

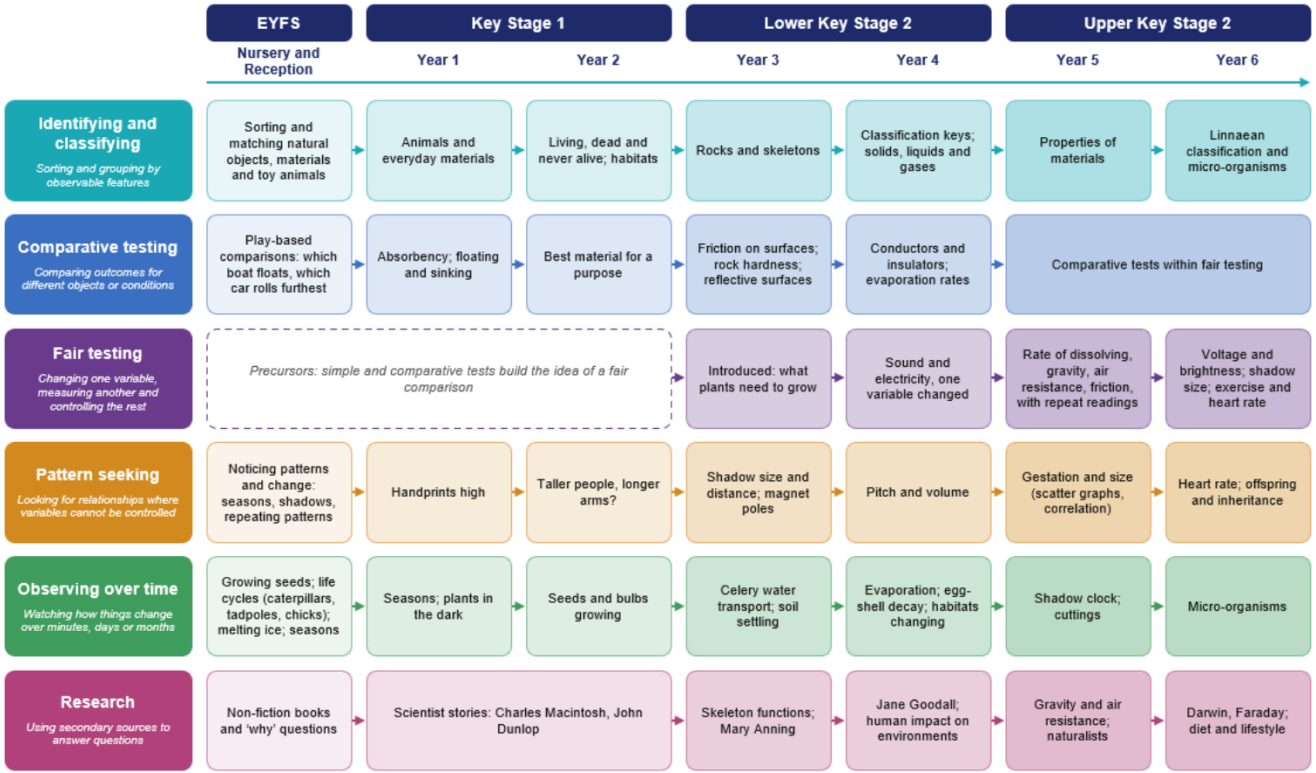
Year group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Humans *(Fair testing; Pattern seeking)* Scientist study: Santorio Santorio	*(Research; Pattern seeking)* Scientist study: Charles Darwin ★ Climate change link	*(Fair testing; Comparative testing)* Scientist study: Michael Faraday	*(Pattern seeking; Fair testing)*	**Habitats** *(Identifying & classifying; Research)* ★ Climate change link	**and Science Fair** *(All enquiry types)*
	Y4 link: digestive system and teeth; Y3 link: nutrition, skeleton and muscles; Y2 link: exercise and health.	*Y3 link: fossils (Rocks); Y5 link: reproduction and life cycles; Y4 link: habitats change and adaptation.*	*Y4 link: simple series circuits, switches, conductors and insulators.*	*Y3 link: light sources, reflection and shadows.*	*Y4 link: classification keys and grouping; Y5 link: life cycles and reproduction.*	*Applies substantive and disciplinary knowledge from all six years; Science Fair for parents at Townhall and Britwell.*

3. Progression of Working Scientifically Skills

Skill strand	EYFS (Nursery and Reception)	Key Stage 1 (Years 1 and 2)	Lower Key Stage 2 (Years 3 and 4)	Upper Key Stage 2 (Years 5 and 6)
Asking questions and planning	Show curiosity about objects, events and people through play; ask questions to find out more ('why?', 'what will happen if…?'); with adult modelling, decide what to try next and choose the resources to carry out their own plan (playing and exploring).	Ask simple questions and recognise that they can be answered in different ways. Perform simple tests set up by the teacher, with growing independence in Year 2.	Ask relevant questions and use different types of scientific enquiry to answer them. Set up simple practical enquiries, comparative and fair tests, beginning to identify what to change, measure and keep the same.	Plan different types of scientific enquiry to answer questions, including recognising and controlling variables where necessary. Make decisions about which enquiry type will answer a question best.
Observing and measuring	Use all their senses in hands-on exploration of natural materials; describe what they see, hear and feel whilst outside; look closely with magnifiers in continuous provision; compare size, length, weight and capacity directly (longer, heavier, full) without formal units.	Observe closely, using simple equipment such as magnifiers. Measure using non-standard units (Y1) moving to simple standard units (Y2). Observe changes over time (seasons, growing plants).	Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment including thermometers, force meters and data loggers.	Take measurements using a range of scientific equipment with increasing accuracy and precision, taking repeat readings when appropriate and recognising when repeats are needed.
Identifying, classifying and grouping	Sort and match objects, natural materials and toy animals by colour, size, shape or type; explore collections of materials with similar and different properties; name familiar plants, animals and materials and notice similarities and differences.	Identify and classify using observable features; sort into groups using hoops, Venn and Carroll diagrams; name living things and materials.	Group and classify using given criteria and begin to use and create simple classification keys; group rocks, materials and living things by properties.	Use and create branching classification keys; classify using the Linnaean system; justify classification decisions using specific characteristics.
Recording	Draw pictures of animals and plants (Natural World ELG); make marks, take photographs and contribute to floor books and class displays; observations and ideas captured through talk and adult scribing.	Gather and record data to help answer questions using labelled drawings, simple tables, tally charts, pictograms and block graphs, with support.	Gather, record, classify and present data in a variety of ways: tables, bar charts, labelled diagrams and keys. Record findings using simple scientific language.	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. Choose the most appropriate way to record.
Pattern seeking, results and conclusions	Notice and talk about patterns and change in the natural world (seasons, growing, melting); offer explanations for why things might happen (Speaking ELG); make links between ideas (creating and thinking critically).	Use observations and ideas to suggest answers to questions; notice simple patterns (taller people have longer arms?).	Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions; identify patterns in data (shadow size and distance).	Use test results to make predictions and set up further comparative and fair tests; identify patterns and correlations and consider whether one factor causes another (gestation and size).
Using evidence and evaluating	Talk about what happened and whether it was what they expected; keep on trying when something does not work and change their approach (active learning); with adults, review what they did and what they found out.	Begin to say what they found out and whether it matched what they thought.	Use straightforward scientific evidence to answer questions or support findings; begin to say how a test could be improved.	Identify scientific evidence that has been used to support or refute ideas or arguments; report the degree of trust in results; evaluate methods and suggest improvements.
Communicating and	Talk about what they see using a wide	Talk about what they have found out	Report on findings from enquiries,	Report and present findings from

Skill strand	EYFS (Nursery and Reception)	Key Stage 1 (Years 1 and 2)	Lower Key Stage 2 (Years 3 and 4)	Upper Key Stage 2 (Years 5 and 6)
vocabulary	vocabulary; use new vocabulary through the day and in different contexts; offer their own ideas in small group and class discussions; listen to and talk about non-fiction to build new knowledge and vocabulary.	using key scientific words with visuals; simple sentence stems.	including oral and written explanations, displays or presentations of results and conclusions, using scientific vocabulary.	enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and presentations.
Scientist study focus	Show interest in different occupations, including people who help us and people who find things out; meet visitors and hear stories about real people; begin to see themselves as scientists who look closely, ask questions and have a go.	Learn from what other scientists have already found out (Charles Macintosh, John Dunlop): perform simple tests and gather data as they did.	Use evidence and research to draw conclusions like Mary Anning; plan and conduct an investigation and use evidence like Jane Goodall.	Research and use evidence, conduct independent investigations and communicate and evaluate findings, following Maggie Aderin-Pocock, Silver and Fry, Galileo, Santorio, Darwin and Faraday.

Enquiry Types Across The School



Each row shows how one type of scientific enquiry builds from the EYFS to Year 6; the shading deepens as pupils take on more of the enquiry themselves. Dashed boxes show precursors before an enquiry type is formally introduced. Year 6 applies all six types in the Independent Science Enquiry and Science Fair.

4. Progression of Knowledge and Vocabulary: Biology, Chemistry and Physics

BIOLOGY

Plants

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
EYFS – Understanding the World: The Natural World (Nursery and Reception)	• ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants. • DM: Plant seeds and care for growing plants; understand the key features of the life cycle of a plant. • DM: Understand the effect of changing seasons on the natural world around them. • Provision: growing beans, cress and sunflowers and noticing what they need (water, light); naming flowers, trees and leaves in the school grounds; noticing how plants and trees change across the year.	Observing closely and drawing what they see; caring for plants over time and talking about how they change; simple sorting (leaves, seeds, flowers); using talk to describe and explain.	*seed, plant, grow, flower, petal, leaf, stem, root, tree, soil, water, sunshine, bigger, taller*
Y1 – Plants (Summer)	• 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.	Observing closely using magnifiers; identifying and classifying wild and garden plants; observing over time (seeds and bulbs, plants in the dark); gathering data (tallies).	*leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud, deciduous, evergreen, wild plant, garden plant*
Y2 – Plants (Spring 2)	• Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	Performing simple tests (plants in different conditions); observing over time; measuring height in cubes/cm; recording in block graphs; pattern seeking (tallest plants, longest roots?).	*seed, bulb, germinate, grow, mature plant, roots, shoot, water, light, temperature, healthy, measure, height, block graph*
Y3 – Plants (Summer)	• 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, 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.	Setting up a fair test (what plants need); making systematic observations over time and measuring accurately; recording in tables and bar charts; drawing conclusions; observational drawing (flower dissection).	*photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind, animal, water), roots, stem, leaves, flowers, nutrients, transported*
Y5 – Living Things (Autumn 2)	• Describe the life process of reproduction in some plants: sexual reproduction (pollination, fertilisation, seed formation) and asexual reproduction (runners, bulbs, tubers, cuttings).	Observing over time (cuttings and plantlets); using evidence to explain how asexual reproduction supports crop farming; recording with scientific diagrams.	*fertilisation, germination, pollination, seed dispersal, asexual, plantlets, runners, bulbs, cuttings*
Y6 – Living Things (Summer 1)	• Classify plants into flowering and non-flowering plants (mosses, ferns, conifers), giving reasons based on specific characteristics.	Identifying and classifying; using and creating classification keys; observing closely and recording with labelled scientific diagrams.	*flowering, non-flowering, mosses, ferns, conifers, classification, taxonomy*

Animals Including Humans

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
EYFS – Understanding the World: The Natural World; PSED: Managing Self; Physical Development (Nursery and Reception)	• ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants. • DM: Understand the key features of the life cycle of a plant and an animal; use all their senses in hands-on exploration of natural materials. • ELG (Managing Self): Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices. • DM: Know and talk about the different factors that support their overall health and wellbeing (including regular physical activity, healthy eating and toothbrushing). • Provision: naming body parts through songs and self-portraits; talking about the five senses; naming and describing pets, farm animals and wild animals and matching them to their young.	Observing and drawing animals and themselves; matching adult animals to their young; sensory exploration and describing what they notice; talking about being healthy.	*head, arm, leg, hand, foot, eye, ear, nose, mouth, see, hear, smell, taste, touch, pet, farm animal, wild animal, baby, grow, healthy, fruit, vegetables, exercise, teeth, wash*
Y1 – Animals Including Humans (Autumn)	• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals, and those 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 and say which part is associated with each sense.	Identifying and classifying; observing closely; performing simple sensory tests; measuring in non-standard units; recording in pictograms and block graphs.	*head, shoulders, knees, toes, eyes, ears, senses (hearing, smelling, seeing, feeling, tasting), mammal, fish, fin, gill, scales, bird, feather, amphibian, reptile, carnivore, herbivore, omnivore*
Y2 – Animals Including Humans (Summer)	• Notice that animals, including humans, have offspring which grow into adults. • Find out about and describe the basic needs of animals for survival (water, food and air). • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	Pattern seeking (do taller people have longer arms?); performing simple tests (heartbeat and exercise); gathering and recording data in tables; sequencing life stages.	*survival, exercise, nutrition, hygiene, offspring, develop, energy, pulse, oxygen, diet, life cycle, infant, teenager, elderly*
Y3 – Animals Including Humans (Autumn 1)	• Identify that animals, including humans, need the right types and amount of nutrition and cannot make their own food. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement.	Research using secondary sources; grouping and classifying (skeleton types); using models (arm and muscle model); recording with labelled diagrams.	*nutrition, nutrients, carbohydrates, protein, vitamins, minerals, fibre, fat, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine*
Y4 – Animals Including Humans (Autumn 2)	• 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.	Using models to explain a process (digestion model); observing over time (egg-shell tooth decay); using evidence (teeth and skulls) to identify animals; constructing food chains and predicting the impact of change.	*digestive system, oesophagus, stomach, small/large intestine, nutrients, incisor, canine, molar, premolar, producer, predator, prey, food chain*
Y6 – Animals Including Humans (Autumn 1)	• 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	Planning a fair test/pattern-seeking enquiry (exercise and heart rate) with repeat readings; recording in line and scatter	*heart, blood vessels, arteries, veins, capillaries, blood, circulatory system, oxygen, nutrients, diet, exercise, drugs,*

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
	way the body functions. • Describe the ways in which nutrients and water are transported within animals, including humans.	graphs; research using secondary sources and evaluating evidence.	*lifestyle, pulse, heart rate*

Living Things and Their Habitats

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
EYFS – Understanding the World: The Natural World (Nursery and Reception)	• ELG: 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. • DM: Begin to understand the need to respect and care for the natural environment and all living things. • DM: Recognise some environments that are different to the one in which they live. • Provision: minibeast hunts and bug hotels in the outdoor area; talking about where animals live (nests, ponds, under logs); habitats met in stories and non-fiction (jungle, ocean, polar lands).	Exploring the outdoor area and describing what they see, hear and feel; looking closely at minibeasts with magnifiers; sorting living things by where they live; caring for living things.	*alive, living, animal, minibeast, home, nest, pond, garden, woodland, jungle, sea, hot, cold, care, look after*
Y2 – Living Things and Their Habitats (Autumn)	• 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 and describe how habitats provide for basic needs and how living things depend on each other. • Identify and name plants and animals in their habitats, including microhabitats. • Describe how animals obtain their food from plants and other animals using a simple food chain.	Identifying and classifying; fieldwork in the school grounds (minibeast hunts); gathering and recording data in tally charts; using ideas to suggest answers (what would happen without the Sun?).	*living, dead, never been alive, suited, basic needs, food chain, shelter, habitat, microhabitat, pond, woodland*
Y4 – Living Things and Their Habitats (Summer)	• 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 the local and wider environment. • Recognise that environments can change and that this can sometimes pose dangers to living things.	Identifying and classifying; using and creating dichotomous keys; observational drawing; observing habitats over time; research into human impact and climate change; planning and carrying out a local wildlife action project.	*classification, classification key, dichotomous key, vertebrate, invertebrate, habitat, adapt, endangered, environment, deforestation, climate change, wildlife*
Y5 – Living Things and Their Habitats (Autumn 2)	• 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.	Pattern seeking with data analysis (gestation period and size – scatter graphs and correlation); observing over time (cuttings); research into the work of naturalists.	*life cycle, reproduction, gestation, fertilisation, metamorphosis, asexual, plantlets, runners, cuttings*
Y6 – Living Things and Their Habitats (Summer 1)	• Describe how living things are classified into broad groups according to common observable characteristics, including micro-organisms, plants and animals. • Give reasons for classifying plants and animals based on specific characteristics.	Identifying and classifying using the Linnaean system; creating classification keys; observing over time (micro-organisms); reporting findings including degree of trust in results.	*vertebrates, invertebrates, warm-blooded, cold-blooded, flowering, non-flowering, micro-organisms, classification, taxonomy*

Evolution and Inheritance

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
EYFS – Understanding the World: The Natural World; Past and Present (Nursery and Reception) – foundation	• DM: Understand the key features of the life cycle of a plant and an animal. • DM: Begin to make sense of their own life-story and family's history; comment on images of familiar situations in the past. • ELG (Past and Present): Know some similarities and differences between things in the past and now, drawing on their experiences and what has been read in class. • Provision: baby animals and their parents (hatching chicks, farm visits, small world play); how they have grown and changed since they were babies; dinosaurs and bones met through books and small world play.	Matching and comparing (adult and young animals, then and now photographs); sequencing growth and change; talking about similarities and differences.	*baby, young, adult, grow, change, same, different, family, long ago, old, dinosaur, bones*
Y3 – Rocks (Spring 1)	• Describe in simple terms how fossils are formed when things that have lived are trapped within rock (Mary Anning scientist study).	Observing closely; using evidence and research to make conclusions.	*fossil, layers, sedimentary*
Y6 – Evolution and Inheritance (Autumn 2)	• 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.	Identifying scientific evidence used to support or refute ideas (fossils, Darwin's finches); using models and simulations (peppered moth, beak simulation); recording in tables and bar charts.	*offspring, vary, characteristics, adapted, inherited, species, fossils, evolution, adaptation, variation, inheritance*

CHEMISTRY

Materials, Rocks and States of Matter

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
EYFS – Understanding the World: The Natural World; Expressive Arts and Design: Creating with Materials (Nursery and Reception)	• DM: Use all their senses in hands-on exploration of natural materials; explore collections of materials with similar and/or different properties. • DM: Talk about the differences between materials and changes they notice. • ELG: Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. • ELG (Creating with Materials): Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. • Provision: sand, water, mud kitchen and digging (stones, pebbles, soil); ice melting and water freezing; cooking and mixing; junk modelling with wood, card, plastic and fabric.	Exploring and describing materials using the senses; sorting collections by simple properties (hard/soft, rough/smooth); noticing changes (melting, freezing, mixing, cooking) and talking about why they happened.	*hard, soft, rough, smooth, bumpy, shiny, wet, dry, sticky, bendy, heavy, light, wood, metal, plastic, paper, fabric, stone, sand, water, ice, melt, freeze, mix, change*
Y1 – Everyday Materials (Spring)	• 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 everyday materials and compare and group them on the basis of these properties.	Identifying and classifying; performing simple tests (floating and sinking, absorbency, waterproofing – Charles Macintosh); gathering and recording data.	*object, material, wood, plastic, glass, metal, water, rock, hard, soft, stretchy, stiff, bendy, waterproof, absorbent, rough, smooth, shiny, dull, see-through*
Y2 – Uses of Everyday Materials (Spring 1)	• Identify and compare the suitability of a variety of everyday materials for particular uses. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Comparative testing (best material for mopping up spills); performing simple tests; learning how scientists created new materials (John Dunlop).	*suitable, absorbent, squash, bend, twist, stretch, brick, paper, cardboard, invent, inventor*
Y3 – Rocks (Spring 1)	• 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.	Identifying and classifying; comparative tests (hardness, permeability); using models (rock formation); observing over time (soil settling).	*rock, grain, crystals, layers, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, peat*
Y4 – States of Matter (Autumn 1)	• Compare and group materials according to whether they are solids, liquids or gases. • Observe that some materials change state when heated or cooled, and measure or research the temperature at which this happens in °C. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Grouping and classifying; comparative tests and observing over time (evaporation rates); measuring temperature in °C; recording in tables and bar charts; using models (water cycle).	*solid, liquid, gas, melt, freeze, melting point, boiling point, evaporate, condense, water cycle, water vapour, precipitation, degrees Celsius, thermometer*
Y5 – Properties and Changes of Materials (Spring)	• Compare and group everyday materials on the basis of properties including hardness, solubility, transparency, conductivity (electrical	Planning and carrying out fair tests (rate of dissolving) with repeat readings; recording in tables and line graphs; using evidence from	*thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve,*

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
	and thermal) and response to magnets. • Know that some materials dissolve 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 (filtering, sieving, evaporating). • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes result in the formation of new materials and are not usually reversible (burning, acid on bicarbonate of soda).	tests to justify choices; identifying and classifying reversible and irreversible changes.	*reversible/non-reversible change, burning, rusting, new material*

PHYSICS

Forces

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
EYFS – Understanding the World: The Natural World; Physical Development (Nursery and Reception) – foundation	• DM: Explore and talk about different forces they can feel. • DM: Explore how things work. • Provision: pushing, pulling, throwing, rolling and kicking in physical play; ramps, cars and balls in construction play; floating and sinking in water play; magnetic letters, boards and toys.	Trying things out and noticing what happens (faster, slower, further); comparing in play (which car rolls furthest, which boat floats); talking about what they feel when they push and pull.	*push, pull, fast, slow, heavy, light, roll, slide, float, sink, stop, go, magnet, stick*
Y3 – Forces and Magnets (Autumn 2)	• Compare how things move on different surfaces. • Notice that some forces need contact between two objects but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others; group materials by whether they are attracted to a magnet. • Describe magnets as having two poles and predict whether two magnets will attract or repel.	Comparative testing (surfaces and distance travelled); making predictions; pattern seeking (poles); gathering and recording data in tables and bar charts.	*force, push, pull, friction, surface, contact force, non-contact force, magnet, magnetic, attract, repel, pole, north pole, south pole, iron, steel*
Y5 – Forces (Summer)	• 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.	Planning fair tests (gravity, air resistance, friction) with repeat readings; measuring force in newtons with force meters; recording in tables and line graphs; research (Galileo and Newton); using models (mechanisms).	*force, gravity, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears, newtons*

Light

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
EYFS – Understanding the World: The Natural World (Nursery and Reception) – foundation	• DM: Describe what they see, hear and feel whilst outside. • ELG: Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. • Provision: torches and a light box or dark den; noticing and playing with shadows outdoors on sunny days; talking about day and night, dark winter mornings and light summer evenings; sun safety (hats, shade and sun cream).	Exploring light and dark through play; noticing shadows and how they move; describing what they see using words such as bright, dark and shiny.	*light, dark, bright, shiny, shadow, torch, Sun, day, night*
Y3 – Light (Spring 2)	• 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 light from a light source is blocked by an opaque object, and find patterns in the way the size of shadows change.	Comparative testing (reflective surfaces); pattern seeking (shadow size and distance); making careful observations; recording in tables and bar charts.	*light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, shadow, reflect, mirror, sunlight*

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
Y6 – Light (Spring 2)	• 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, and to explain why shadows have the same shape as the objects that cast them. • 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.	Planning fair tests (shadow size); measuring angles (reflection); recording with ray diagrams; using results to make predictions; reporting causal explanations.	*light source, reflect, reflection, ray, straight lines, opaque, translucent, transparent, shadow, mirror, periscope, angle*

Sound

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
EYFS – Communication and Language; Expressive Arts and Design (Nursery and Reception) – foundation	• DM: Listen with increased attention to sounds; sing the pitch of a tone sung by another person ('pitch match'); play instruments with increasing control to express their feelings and ideas. • DM: Listen carefully to rhymes and songs, paying attention to how they sound. • Provision: pre-phonics listening (environmental sounds, instrumental sounds, body percussion); sound walks; making loud and quiet, high and low sounds with instruments and voices; talking about how we hear.	Listening carefully and identifying sounds; comparing sounds (loud/quiet, high/low) made with instruments and voices; describing sounds using a growing vocabulary.	*sound, noise, listen, hear, ear, loud, quiet, high, low, bang, tap, shake, instrument*
Y1 – Animals Including Humans (Autumn	• Say which part of the body is associated with the sense of hearing.	Observing closely; performing simple sensory tests.	*hearing, ear, sound*
Y4 – Sound (Spring 2)	• 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, and 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.	Pattern seeking (pitch and volume); comparative testing (sound through materials); measuring with data loggers; recording in tables and bar charts.	*sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation*

Electricity

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
EYFS – Understanding the	• There is no direct EYFS framework statement about electricity;	Exploring how things work by trying them out	*electricity, plug, socket, switch, on, off,*

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
World (Nursery and Reception) – foundation	the foundation is curiosity about how things work and everyday experience of electrical appliances. • DM: Explore how things work. • Provision: torches, battery-operated toys, remote controls, light switches and programmable toys; noticing what needs electricity to work (lights, computers, kettles); talking about keeping safe around plugs and sockets.	(switches on and off, batteries in and out); asking 'why?' and 'how?' questions; talking about what they notice.	*battery, torch, light, bulb, safe, danger*
Y4 – Electricity (Spring 1)	• Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts. • Identify whether or not a lamp will light in a simple series circuit based on whether the lamp is part of a complete loop. • Recognise that a switch opens and closes a circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors.	Setting up simple practical enquiries; comparative testing (conductors and insulators); recording predictions and results in tables; drawing simple conclusions.	*electricity, appliance, mains, circuit, complete circuit, component, cell, battery, bulb, switch, buzzer, conductor, insulator, metal*
Y6 – Electricity (Spring 1)	• 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. • Use recognised symbols when representing a simple circuit in a diagram.	Planning fair tests (voltage and brightness) with repeat readings; measuring with lux meters; recording with circuit diagrams and graphs; research (Michael Faraday).	*circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage, current, lux meter*

Earth and Space (and Seasonal Changes)

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
EYFS – Understanding the World: The Natural World (Nursery and Reception)	• ELG: Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. • DM: Understand the effect of changing seasons on the natural world around them. • DM: Describe what they see, hear and feel whilst outside. • Provision: daily weather talk and simple weather charts; seasonal walks and collections (leaves, conkers, blossom); noticing day and night and the Sun, Moon and stars in stories and in the sky; dressing for the weather.	Observing over time (the same tree across the year); talking about the weather each day and beginning to record it with pictures; noticing and describing changes in the environment.	*weather, sunny, rainy, windy, cloudy, snowy, hot, cold, autumn, winter, spring, summer, day, night, Sun, Moon, stars, sky*
Y1 – Seasonal Changes (ongoing strand)	• Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies.	Observing over time (termly seasonal walks); gathering and recording data (weather charts); identifying changes.	*season, autumn, winter, spring, summer, weather, temperature, day, night, day length*
Y5 – Earth and Space (Autumn 1)	• 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.	Using models to demonstrate movement; observing over time (shadow clock); research using secondary sources; identifying patterns.	*Earth, Sun, Moon, planets (Mercury to Neptune), spherical, solar system, rotates, star, orbit*

Year and unit	Knowledge (EYFS / National Curriculum)	Working scientifically focus	Key vocabulary
	• 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.		

5. Scientist study across the school

Each year group studies significant scientists linked to the units taught, so that pupils see how scientific knowledge is built through evidence and enquiry and encounter a range of role models.

Year	Scientist(s)	Curriculum link	Scientific skill	Key knowledge	Key question
Year 1	**Charles Macintosh**	Everyday Materials	Perform simple tests; gather and record data	Charles Macintosh invented the first waterproof coat, known as a 'Macintosh'.	*How did Charles Macintosh change everyday materials to make them more waterproof?*
Year 2	**John Dunlop**	Uses of Everyday Materials	Perform simple tests; gather and record data	He improved the rubber tyre by making it pneumatic (filled with air), making tyres softer, more comfortable and better for vehicles than solid rubber or wooden wheels.	*How did John Dunlop create new material?*
Year 3	**Mary Anning**	Rocks and soil	Observing closely; identifying and classifying; using evidence and research to make conclusions	Fossils are the remains of ancient plants and animals, turned into rock over time. Mary Anning's work helped us understand evolution and how the Earth has changed.	*Who was Mary Anning, and how did her discoveries help us understand fossils?*
Year 4	**Jane Goodall**	Living Things and Their Habitats	Plan and conduct an investigation; use evidence to draw conclusions	Children explore the work of Jane Goodall and how a conservationist's role is to protect animal diversity.	*How can we encourage local wildlife onto our school grounds?*
Year 5	**Maggie Aderin-Pocock; Spencer Silver and Arthur Fry; Galileo Galilei**	Earth and Space; Properties and Changes of Materials; Forces	Researching and using evidence; conducting investigations; communicating findings	Space science and communication; the invention of the Post-it Note from a material's properties; using evidence to challenge accepted ideas about falling objects and gravity.	*How do scientists use evidence from investigations to explain the world and invent new things?*
Year 6	**Santorio Santorio; Charles Darwin; Michael Faraday**	Animals Including Humans; Evolution and Inheritance; Electricity	Researching and using evidence; conducting independent investigations; communicating and evaluating findings	Measurement in medicine; evolution by natural selection; electromagnetic induction and communicating science to the public.	*How did these scientists use careful measurement, observation and evidence to change what we know?*

6. Enrichment across the school

Year	Planned enrichment	Curriculum-embedded experiences
Year 1	**British Science Week (Spring)**	Termly seasonal walks in the school grounds
Year 2	**British Science Week (Spring)**	Minibeast and microhabitat fieldwork in the school grounds
Year 3	**British Science Week (Spring)**	Flower dissection and plant growing across the Summer term
Year 4	**British Science Week (Spring)**	Climate change VR workshop (Summer) – exploring environmental issues from urban pollution to the loss of polar habitats; local wildlife action project (bug hotels, feeders, planting)
Year 5	**Planetarium (Autumn); British Science Week (Spring); Science Fair (Summer)**	Pupils present an enquiry at the whole-school Science Fair
Year 6	**Heart dissection workshop (Autumn); British Science Week (Spring); Science Fair (Summer)**	Three-week Independent Science Enquiry culminating in the Science Fair for parents – Townhall (Week 11) and Britwell (Week 12)

British Science Week is a whole-school themed day across both campuses during Spring, based on the national theme. The Science Fair in Summer brings parents into school at both campuses.

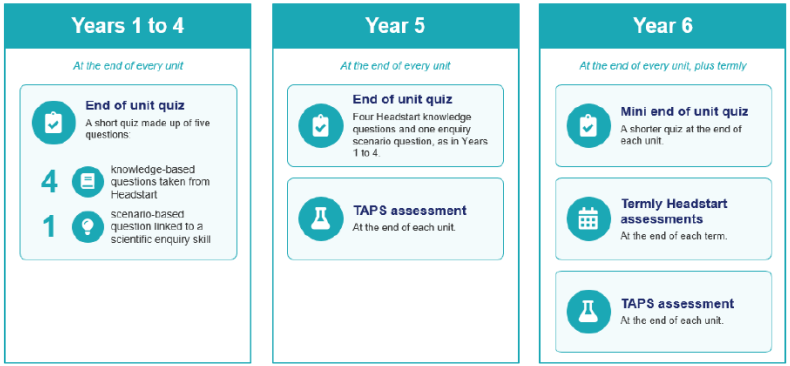
7. Climate change and sustainability links

Reflecting the strengthened emphasis on climate change and sustainability in the national curriculum, this section maps where pupils learn about the changing environment and what we can all do about it.

Year	Units	Climate change and sustainability content	Status
Year 1	**Seasonal Changes (ongoing); Plants**	Observing weather and seasonal change over the year; noticing what plants need and how the seasons affect them.	*Foundational: builds the habit of observing the natural world and noticing change.*
Year 2	**Living Things and Their Habitats**	Habitats provide for the basic needs of living things and living things depend on each other; the Sun as the source of energy for every food chain.	*Foundational: pupils understand interdependence, the basis for later understanding of environmental damage.*
Year 3	**Plants; Rocks**	What plants need to grow well (water, light, temperature); soils are made from rocks and organic matter and are vital for life ('What would happen to our planet without soil?').	*Opportunity: link plant needs and soil health to growing food and protecting land.*
Year 4	**Living Things and Their Habitats (explicit); States of Matter**	Explicit teaching that environments change and this can pose dangers to living things: habitats changing over time, human actions (deforestation, pollution, climate change) endangering species, and helping local wildlife. Climate change VR workshop. Water cycle and the link between temperature and evaporation.	*Explicit: the core climate change unit for KS2, flagged in the Y4 scheme of learning and supported by the VR workshop and Jane Goodall study.*
Year 5	**Living Things and Their Habitats; Properties and Changes of Materials; Earth and Space**	Life cycles and reproduction of plants and animals under threat; naturalists and conservation; irreversible changes including burning; the Earth as a planet in the solar system.	*Opportunity: link burning to fossil fuels and the atmosphere; link naturalists' work to protecting species.*
Year 6	**Evolution and Inheritance; Living Things and Their Habitats; Independent Science Enquiry**	Adaptation to environments and what happens when environments change faster than species can adapt (evolution); classification and biodiversity including micro-organisms; pupils' own enquiries may address local environmental questions.	*Explicit within Evolution: adaptation and changing environments. Science Fair provides a platform for climate-focused enquiries.*

8. Retrieval and assessment across the school

Year	Retrieval quiz (start of every lesson)	Summative assessment	Notes
Year 1	Last lesson only; largely oral, picture-based or whiteboard-based.	Mini end of unit quiz: four knowledge-based questions (Headstart) and one scenario-based question linked to an enquiry skill.	*No dormant topics; Seasonal Changes kept alive through termly walks and the class display.*
Year 2	Last lesson and last unit.	Mini end of unit quiz (as above).	*Dormant topic: Seasonal Changes (Y1), not revisited until Y5 Earth and Space.*
Year 3	Quadrant grid: last lesson, last unit, last term, last year.	Mini end of unit quiz (as above).	*Dormant topics: Everyday Materials (Y1/Y2), Seasonal Changes (Y1), Living Things and Their Habitats (Y2).*
Year 4	Quadrant grid: last lesson, last unit, last term, last year.	Mini end of unit quiz (as above).	*Dormant topics: Plants, Everyday Materials, Seasonal Changes, Rocks, Light, Forces and Magnets.*
Year 5	Quadrant grid: last lesson, last unit, last term, last year.	Mini end of unit quiz plus a TAPS assessment at the end of each unit.	*Dormant topics: Plants, Rocks, Light, States of Matter, Animals Including Humans, Electricity, Sound.*
Year 6	Quadrant grid: last lesson, last unit, last term, last year.	Mini end of unit quiz, TAPS assessment at the end of each unit and termly Headstart assessments.	*Dormant topics (final opportunity before Key Stage 3): Plants, Materials, Rocks, Forces, Sound, Earth and Space.*



9. The Claycots Principles in Science

Claycots Principle	The poster says	In science at Claycots this looks like
Modelling	• Live worked examples • Thinking out loud • Intentional errors	Teachers model practical techniques before pupils use them (reading a thermometer or force meter, using a magnifier, setting up a circuit) and model recording live: the results table, the labelled diagram, the bar or line graph. Predictions and conclusions are thought aloud so pupils hear the reasoning ('I predict… because…'). Intentional errors, such as changing two variables at once or misreading a scale, are used for pupils to spot and correct.
Feedback and Improvement	• Live marking • Conferencing • Editing • Addressing gaps	Feedback is given live during exploratory activities so that technique, recording and use of vocabulary are corrected in the moment. Pupils edit and improve their conclusions and explanations to use the scientific vocabulary and the evidence from their results. End of unit quizzes (Y1 to Y6) and TAPS (Y5 and Y6) identify gaps, which are addressed through the following retrieval quizzes and, where needed, re-teaching before the strand is next revisited (Section 9).
Questioning	• Pre-planned and targeted • Deepen understanding • Increase the ratio • Culture of error	Every lesson is framed around an enquiry question and every unit opens with a knowledge harvest of pupils' own questions and ideas. Questions are pre-planned in the schemes of learning and targeted at the common misconceptions listed for each unit. Think, pair, share and whiteboards mean every pupil predicts and explains, not only the volunteers. Wrong predictions are treated as evidence to test rather than as mistakes, mirroring how the scientists studied (Galileo, Darwin) changed accepted ideas.
Checking for Understanding	• Whole class responses • Focused on learning outcome • Addressing misconceptions	Whole class responses (whiteboards, hinge questions, show me) check the learning intention rather than completion of the practical. The retrieval quiz at the start of every lesson and AfL at the plenary show whether knowledge has stuck. The misconceptions listed in each scheme are checked for explicitly and addressed before pupils record. The end of unit quiz pairs four knowledge questions with an enquiry skill scenario, so both substantive and disciplinary knowledge are checked.
Oracy and Vocabulary	• Standard English • Oracy tools • Sentence stems • Explicit teaching	Key vocabulary is listed for every unit, taught explicitly with visuals in every lesson and built cumulatively across the strands (Section 5). Pupils are expected to use the precise scientific term rather than the everyday word (dissolve, not disappear; evaporate, not dry up). Sentence stems scaffold predictions, conclusions and explanations ('Our results show… therefore…'). Talk during practical work, reporting findings to the class and presenting at the Science Fair develop pupils' scientific oracy.
Adaptations	• Scaffolding for all • Flexible grouping • Effective interventions • Appropriate resources	SEND adaptations are specified for every lesson in every scheme of learning. Scaffolds include word banks with visuals, partially completed tables, writing frames for conclusions and modelled diagrams. Practical work uses flexible groupings with clear roles. Where the retrieval quiz shows gaps, vocabulary and prerequisite knowledge are pre-taught. Resources are prepared on the Science Trolleys and ClickView provides visual stimulus for pupils who need it.
Securing Retention	• Based on AFL • Retrieval practice • Build schemas	A retrieval quiz opens every lesson, growing from 'last lesson' in Y1 to the full quadrant (last lesson, last unit, last term, last year) from Y3, with dormant topics deliberately revisited (Section 9). Units are sequenced so each builds on named prior learning (Section 3) and knowledge is organised into Biology, Chemistry and Physics strands (Section 5) so pupils build the schemas they will need at Key Stage 3. Vocabulary is cumulative: earlier words are revisited and built upon.
Classroom Management	• Routines and expectations • Adult deployment • Pace and engagement • Relationships • Learning environments	Consistent routines for practical work: safety expectations, collecting and returning equipment, group roles and clearing away. Adults are deployed to the groups identified through AfL during exploratory activities. A consistent lesson structure (retrieval quiz, enquiry question, exploratory activity, recording, plenary) keeps pace and gives pupils security. Hands-on enquiry, videos and real-life images sustain engagement. Science displays and vocabulary walls, including the Y1 Seasonal Changes display, make the environment part of the learning.

Planning and reflecting on science lessons with the Claycots Principles

Step	The poster asks	In science at Claycots this means
Before the lesson: planning		
Know	• Subject knowledge • Links in the curriculum • Pitch and expectations • Lesson content • Misconceptions • Sequence and progression	Read the unit in the scheme of learning alongside the strand progression (Section 5) to see what pupils learned before and where the unit leads. Note the National Curriculum statements, the working scientifically expectations for the key stage (Section 4) and the misconceptions listed for the unit. Use ClickView and CPD resources recommended by subject leader to secure subject knowledge before teaching.
Learn	• Identify the learning (not task) outcome • Do pupils have the pre-requisites? • Is any pre-teaching required?	The learning intention is the knowledge or skill (‘explain that…’, ‘set up a fair test to…’), not the practical activity. Use the ‘last year’ retrieval question as a pre-assessment before a new unit (Section 9). Pre-teach vocabulary or prerequisite knowledge from earlier strands where gaps appear.
Evaluate	• Is existing planning appropriate and engaging? • Explore with the planner • Discuss with the subject leader • Impact of resources on cognitive load	Trial the exploratory activity and check the equipment on the Science Trolley before the lesson. Manage cognitive load: chunk multi-step practicals, model recording first and keep the enquiry question visible throughout. Discuss with the science subject leader where the practical, the video or the resources need changing.
Adapt	• Make changes for individual needs in your class • Plan questions • Plan vocabulary • Plan resources to scaffold	Start from the SEND adaptations in the scheme and adjust them for your class. Plan targeted questions around the listed misconceptions. Plan the key vocabulary with visuals and the sentence stems pupils will need. Prepare scaffolds (word banks, partially completed tables, writing frames).
After the lesson: reflecting		
What do you know?	• What did the books show you? • What did you observe when checking for understanding? • What misconceptions occurred?	Do pupils’ recording and conclusions show the knowledge and the skill, or only that the activity was completed? Which of the listed misconceptions appeared, and which unexpected ones? What did the retrieval quiz and the end of unit quiz reveal about this unit and earlier ones?
What are you going to do?	• What further adaptations do you need for next lesson? • Are any interventions needed? • Do any concepts need revisiting?	Adjust the next retrieval quiz to revisit the gap. Adapt scaffolds and groupings for the next lesson. Plan a short intervention before the next practical. Flag concepts to revisit in the ‘last unit’ and ‘last term’ quadrants.
What are your reflections?	• Was the lesson content and resources suitable? • What should you share with your team and/or the subject leader?	Did the exploratory activity produce the evidence pupils needed to answer the enquiry question? Were the resources and videos suitable? Share what worked and what needs changing with the year group team and the science subject leader so the scheme of learning is refined.
What do you need to develop?	• What part of your teaching practice will you need to work on?	Identify the subject knowledge or enquiry types you are less confident with (for example fair testing with repeat readings, or physics content) and seek support from the science subject leader, your team or science CPD.