# Curriculum Intent & Implementation
# Subject Overview for – Science

St. Peter's
Church of England Primary School

## Contents

## Purpose of Study – National Curriculum

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.

## St Peter's Curriculum Intent Statement for Science

Our young scientists will acquire life-long enquiry science skills, in order to explore and understand the world they live in, alongside the vast knowledge of the disciplines of biology, physics and chemistry. They will also develop an understanding of the vital role that major scientific ideas and scientists have played in society. In doing so, all our children, regardless of their starting points, will be fully prepared for their next stage of science education, and beyond.

Science is taught discretely, with a focus on substantive knowledge-rich content and the development of essential disciplinary knowledge. The National Curriculum programmes of study and Early Years Foundation Stage framework are fully adhered to and then supplemented with additional knowledge-rich content. This provides a coherent science curriculum that both prepares children extremely well for future learning and gives them the tools to independently investigate and explore the world further.

The science curriculum encourages children to be curious about natural phenomena and to be excited by the process of understanding the world around them. We want our children to remember the concepts they learn. Therefore, the curriculum focuses on the sequential development of essential substantive knowledge underpinning biology, chemistry and physics, as per the science progression map below. Over time, these building blocks of component learning are transformed into a deep understanding of the real world. Each year group deepens their understanding of key concepts, adding new generative knowledge to existing schema. For example, the biology strand of 'plants' is revisited multiple times throughout the year groups, with the component learning of basic plant structure in Year 1 transforming into the composite learning of water transportation within plants in Year 3.

Procedures and concepts that underpin scientific methods are developed through the systematic focus on disciplinary knowledge. Every unit of work contains opportunities to develop the Working Scientifically skills of asking questions, planning enquiries, observing, measuring, recording, presenting and interpreting results, drawing conclusions, predicting and evaluating, according to the progression in these skills as per the science progression map. Thus, essential science concepts are developed whilst children investigate the world around them. The different approaches to science enquiry, such as fair testing, research and classifying are also systematically developed in the disciplinary knowledge section of the progression map.

## Science National Curriculum 2014 Aims and Subject Content

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

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

| Key Stage 1 | Key Stage 2 |
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| • Enable pupils to experience and observe phenomena, looking more closely at the natural and humanly constructed world around them.<br>• Encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information.<br>• Begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways.<br>• Experience first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.<br>• Work scientifically, clearly related to the teaching of substantive science content in the programme of study.<br>• Read and spell scientific vocabulary at a level consistent with their increasing word-reading and spelling knowledge at key stage 1. | • Enable pupils to broaden their scientific view of the world around them: exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions.<br>• Encouraged to ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.<br>• Working scientifically, clearly related to substantive science content in the programme of study.<br>• Read and spell scientific vocabulary correctly and with confidence, using their growing word-reading and spelling knowledge.<br>• Enable pupils to develop a deeper understanding of a wide range of scientific ideas: exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically.<br>• Encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates.<br>• Recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out |

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| | comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.<br>• Work and think scientifically, clearly related to substantive science content in the programme of study.<br>• Read, spell and pronounce scientific vocabulary correctly. |

## Essential Characteristics of Learning in Science (The learning characteristics of the subject over time)

- The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings.
- Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations.
- Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.
- High levels of originality, imagination or innovation in the application of skills.
- The ability to undertake practical work in a variety of contexts, including fieldwork.
- A passion for science and its application in past, present and future technologies.

## Science Curriculum Implementation

**Substantive Knowledge** sets out the subject-specific content that is to be learned - i.e. the National Curriculum units that can be separated into the disciplines of biology, physics and chemistry. *This is the knowledge of the products of science, such as concepts, laws, theories and models.* The progression map below, separated into biology, chemistry and physics, sequences the substantive knowledge in the St. Peter's curriculum (agreed core knowledge), from Reception to Year 6, drawing directly from the EYFS framework and National Curriculum.

**Disciplinary Knowledge** considers how substantive knowledge originates, is debated and is revised - *i.e. how we create, contest and evaluate substantive knowledge over time.* Disciplinary knowledge tells us how we know what we know; it is through disciplinary knowledge that pupils learn the enquiry practices of science. It gives an insight into the ways that scientists think - how they ask questions, plan an enquiry, observe, measure, interpret, conclude, predict and evaluate. Disciplinary knowledge enables one to 'think like a scientist'. Disciplinary knowledge in science includes the *Working Scientifically* strand of the National Curriculum, and the key features of scientific enquiry as detailed in the 'aims' of the National Curriculum. Essentially, **Working Scientifically** skills and knowledge of approaches to **science enquiry** are distinct yet connected, and a particular lesson or sequence of learning is likely to incorporate elements of both.

The **Working Scientifically** strand of the National Curriculum includes:

I. *Asking Questions* that are the starting points for different types of science enquiry.
II. *Planning Enquiries* that systematically require more independent decision making.
III. *Observing Closely* and communicating these observations via increasingly more elaborate diagrams.

IV. *Taking Measurements* according to relevant age-related strands of the mathematics National Curriculum.
V. *Recording Results* appropriately, using a variety of tables, tally charts and pictures.
VI. *Presenting Results* in a range of ways, including age-appropriate charts and graphs.
VII. *Interpreting Results* by spotting patterns and describing relationships.
VIII. *Drawing Conclusions* and presenting them orally and in writing.
IX. *Making Predictions* about further results or investigations, by drawing on what has been learnt.
X. Evaluating Enquiries by suggesting improvements and discussing the degree of trust in secondary sources and their results.

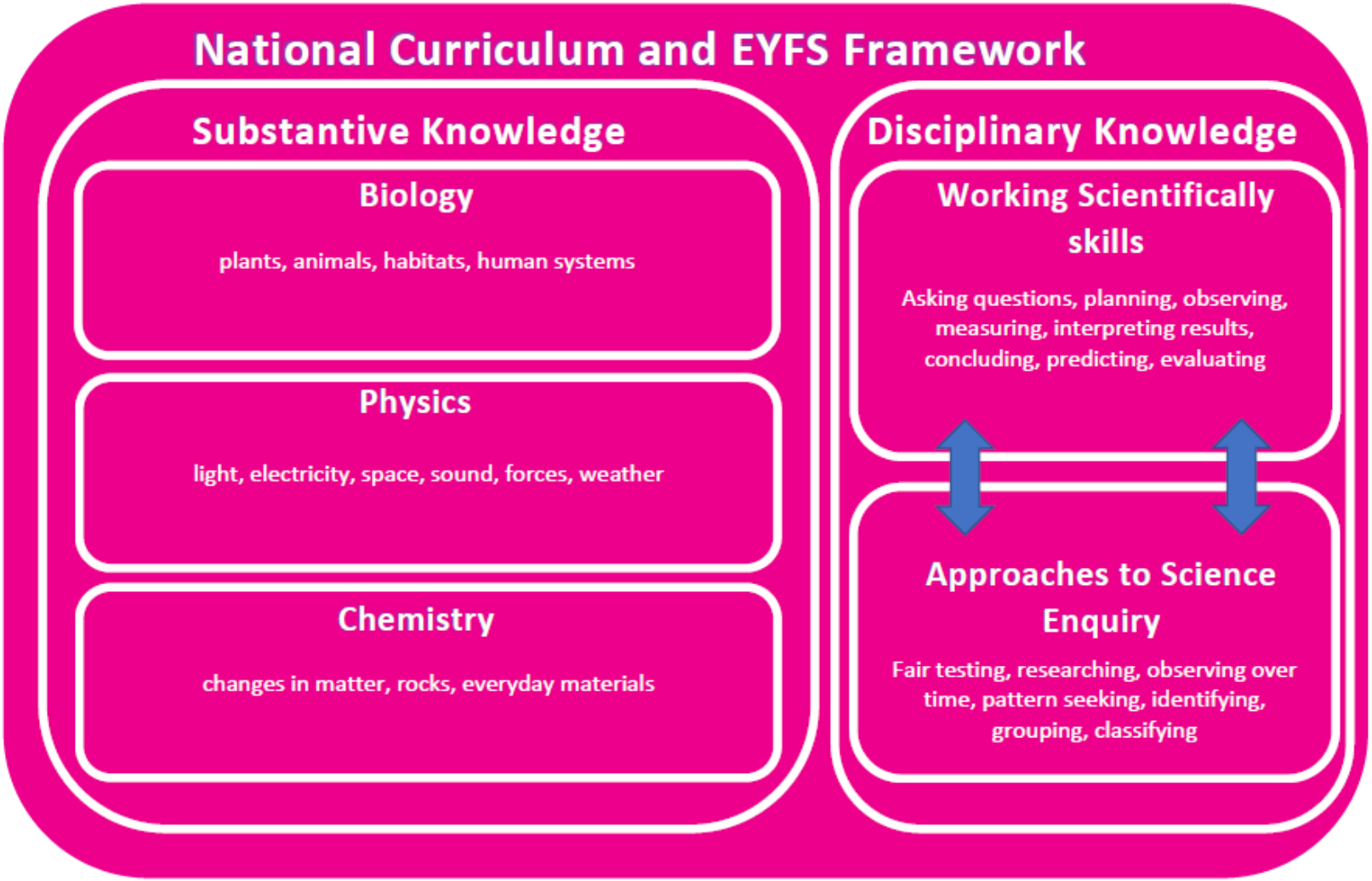
As well as the **Working Scientifically** skills as detailed in (I) to (X) above, disciplinary knowledge in science also consists of the **different approaches that scientists employ in scientific enquiry,** in order to answer relevant scientific questions. These are noted in the 'aims' of the National Curriculum, and include:

I. *Observing over time*, over a range of different spans of time - in the moment and over a longer period of days, weeks or months.
II. *Pattern seeking*, including the use of scatter graphs in UKS2.
III. *Identifying, classifying and grouping*, by working with Venn diagrams, Carrol diagrams and branching databases.
IV. *Comparative and fair testing* (controlled investigations), by controlling variables, presenting data in graphs and describing causal relationships.
V. *Researching using secondary sources,* presenting what is found and using it to answer enquiry questions.

At St. Peter's we use icons to represent the five scientific enquiry skills to support children to make connections and link the different approaches that scientists employ when working scientifically. Posters are displayed in classrooms and referred to during science lessons regularly:


Acquiring disciplinary knowledge is an important curriculum goal and occurs alongside substantive knowledge development. The science enquiries in the St. Peter's curriculum integrate both forms of knowledge. Disciplinary knowledge is introduced, developed and mastered alongside the substantive content of biology, physics and chemistry.

## The Relationship Between Different Kinds of Knowledge in Science



| Disciplinary Knowledge – Working Scientifically Skills and Elements of Science Enquiry<br>Progression Across EYFS and the Primary Phases | | | | |
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| | **EYFS** | **KS1** | **Lower KS2** | **Upper KS2** |
| **Ask Scientific Questions** | • Begin to ask questions about the world around them | • Ask a yes/no questions to aid sorting.<br>• Ask one/two simple research questions linked to a topic.<br>• Choose a question to undertake a fair test.<br>• Ask a question about what might happen over time or that is looking for a pattern. | • Ask a range of Yes/No questions to aid sorting<br>• Ask a range of research questions linked to a topic.<br>• Ask a range of question to undertake a fair test.<br>• Ask a range of question about what might happen over time or that is looking for a pattern. | • Ask a range of Yes/No questions to aid sorting and decide which ways of sorting will give useful information.<br>• Ask a range of questions recognising that some can be answered through research and others may not<br>• Ask a range of questions and identify the type of enquiry that will help to answer the questions.<br>• Ask further questions based on results. |
| **Plan an enquiry** | | • Identify the headings for the two classification groups (it is …., it is not ….)<br>• Choose equipment to use and decide what to do and what to observe or measure in order to answer the question. | • Put appropriate headings onto intersecting Venn and Carroll diagrams.<br>• Choose a research source from a range provided<br>• Decide what to change and what to measure or observe<br>• Decide how often to take a measurement. | • Identify specific clear questions that will help to sort without ambiguity<br>• Choose suitable sources to use<br>• Recognise and independently control variables where necessary.<br>• Decide how often to take a measurement. |
| **To observe closely** | • Explore the natural world around them, making observations and drawing pictures of animals and plants. | • Compare objects based on obvious, observable features, e.g. size, shape, colour, texture etc.<br>• Make observations linked to answering the question. | • Compare objects based on more sophisticated, observable features and present observations in labelled diagrams.<br>• Make a range of relevant observations linked to the question. | • Compare not only based on physical properties but also on knowledge gained through previous enquiry.<br>• Make a range of relevant observations linked to the question. |
| **To take measurements** | | • When appropriate, measure using standard units where all the numbers are marked on the scale. | • Measure using standard units (according to age-related mathematics) where not all the numbers are marked on the scale, and take repeat readings where necessary | • Measure using standard units using equipment that has scales involving decimals (according to age-related mathematics), and take repeat readings where necessary. |

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| | | | • Use dataloggers to measure over time. | • Use dataloggers to measure over time. |
| **To record results** | • Record observations pictorially/photographs. | • Record data in simple prepared tables, tally charts, pictorially or by taking photographs. | • Prepare own tables to record data. | • Prepare own tables to record data, including columns for taking repeat readings |
| **To present results** | | • Sort objects and living things into two group using a basic Venn diagram or simple table,<br>• Present what they have learnt verbally, using pictures or block diagrams. | • Sort objects and living things into groups using intersecting Venn and Carroll diagrams<br>• Present what they learnt verbally or using labelled diagrams, bar charts, or time graphs. | • Create branching databases (tree diagrams) and keys to enable others to name livings things and objects<br>• Present what they learnt in a range of ways e.g. different graphic organisers, line graphs and scatter graphs. |
| **To interpret results** | | • Talk about the number of objects in each classification group i.e. which has more or less.<br>• Answer their questions using simple sentences using their observations or measurements. | • Spot patterns in the classification data, particularly two criteria with no examples - e.g. there are no living things with wings and no legs.<br>• Answer questions using simple scientific language and refer directly to their evidence when answering their question. | • Talk about the features that items share and do not share based on the information in the key etc.<br>• Answer questions using scientific evidence gained from a range of sources. Describe causal relationships, change over time and identify patterns. |
| **To draw conclusions** | | | • Draw simple conclusions, when appropriate, for patterns - e.g. a flying insect with no legs might always crash land.<br>• Where appropriate provide oral or written explanations for their findings. | • Use data to show that items grouped together have more things in common than with things in other groups<br>• Provide detailed oral or written explanations for their findings. |
| **To make a prediction** | | | • Use results from an investigation to make a prediction about a further result. | • Use test results to make predictions for further investigations. |
| **To evaluate an enquiry** | | | • Suggest improvement (e.g. a wider range of objects) and suggest new questions arising from the investigation.<br>• Suggest limitations to research (e.g. only had one book) and suggest new questions arising from the investigation.<br>• Suggest improvements (e.g. measurement method) and | • Explain using evidence that the branching database or classification key will only work for the living things or materials it was created for.<br>• Talk about their degree of trust in the sources they used.<br>• Explain their degree of trust in their results (e.g. precision in measurements, variables that |

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| | | | suggest new questions arising from the investigation. | may not have been controlled, and accuracy of results. |

"Concepts are 'holding baskets' for facts. They help to make sense of multiple pieces of information and this makes them efficient. Concepts are largely, but not exclusively expressions of important ideas within an academic discipline. Our pupils are entitled to know them and to use them. Concepts enable connections to be made across a disparate range of facts; they reside in the long-term memory and can be called on to make sense of new information. Concepts provide the intellectual architecture on to which new knowledge and insights can be pinned" (Mary Myatt)

**Science Long Term Plan (Intent – What and When)**
Key Stage 1 - Year A 2022-2023, Year B 2023-2024
Key Stage 2 - Year A and C (2022 to 2023, 2024 to 2025) Year B and D (2023 to 2024, 2025 to 2026)

| Long Term Plan – What and when | | | | | | |
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| | **Autumn 1** | **Autumn 2** | **Spring 1** | **Spring 2** | **Summer 1** | **Summer 2** |
| **EYFS** | Using our senses<br>Seasons | Animals and animal habitats<br>Seasons | Plants and growing<br>Life cycles<br>Seasons | Materials and changes in states of matter<br>Seasons | Floating and sinking<br>Seasons | |
| **Y1/2 Year A** | Living Things and their Habitats | Seasonal Changes | Movement of Earth and Space | Seasonal Changes | Plants | Seasonal Changes |
| **Y1/2 Year B** | Unit 1 Animals Including Humans – Growth and the Human Body | | Living Things – things that are living/things that are dead/things that have never been alive | Unit 2 Animals Including Humans | Everyday Materials and their Uses | |
| **LKS2 Year A/C** | Sound and Hearing | | Living Things and their Habitats | Plants | | Animals Including Humans |
| **LKS2 Year B/D** | States of Matter | Rocks and Fossils | Light and Sight | | Forces and Magnets | Electricity |
| **Y4/5 Year A/C** | Sound and Hearing | Earth and Space | Living Things and their Habitats | Plants | Animals Including Humans | |
| **Year 4/5 Year B/D** | States of Matter | Properties and Changes of Materials | Light and Sight | | Forces and Magnets | Electricity |
| **UKS2 Year A/C** | Earth and Space | | Living Things and their Habitats | | Animals Including Humans | Evolution and Inheritance |

| UKS2 Year B/D | Properties and Changes of Materials | Light and Sight | Forces and Magnets | Electricity |
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Please refer back to the previous year's core knowledge and vocabulary before starting a topic to assess what the children have retained.

| Progression of Agreed Substantive Knowledge, Disciplinary Knowledge (Scientific Enquiry Skills) and Vocabulary by Unit | | | |
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| **Biology** | | | |
| **Animals Including Humans**<br>This concept involves becoming familiar with different types of animals, humans and life processes they share | | | |
| | Key Stage 1 | Lower Key Stage 2 | Upper Key Stage 2 |
| Year and Term | Unit 1 content is highlighted in blue Year B Autumn Term<br>Unit 2 content Year B Spring Term 2 | Year A and C Summer Term 1 and 2 | Year A and C Summer Term 2 |
| Agreed Core Knowledge (Substantive Knowledge) | *EYFS Prior Knowledge: Talk about and make observations of the animals that I have seen.*<br><br>1. To know that humans are mammals<br>2. The five senses: are sight, touch, hearing, taste and smell<br>3. To stay alive, all animals have three basic needs for survival: air, water, food<br>4. Some animals give birth to live young e.g. horse, cow, sheep. Some animals lay eggs which the young hatch from e.g. birds and develop into adults<br>5. Some offspring look like their adult when they are born and some do not<br>6. To grow into a healthy adult, we must eat the right types of food and do the right amount of exercise<br>7. An omnivore is an animal that eats animals and plants. Animals that only eat animals (or meat) are called carnivores. Animals that eat only plants are called herbivores | 1. Humans need to eat different types of food. Food can be placed into five food groups according to how they help us to stay healthy:<br>• Bread, cereal and potatoes (carbohydrates)<br>• Fruits and vegetables (vitamins and minerals)<br>• Meat and fish (protein)<br>• Milk and dairy (calcium)<br>• Fats and sugars<br>2. It is important to eat the right amount of food from each group. We can measure food using portions.<br>3. Humans and many animals have skeletons to support their bodies and protect vital organs. Muscles are connected to bones and move them when they contract. Movable joints connect bones. | 1. The heart is an organ which constantly pumps blood around the circulatory system.<br>2. The heart pumps blood to the lungs to get oxygen. It then pumps this oxygenated blood around the body. Oxygenated blood has more oxygen.<br>3. Blood vessels are the tube-like structures that carry blood through the tissues and organs.<br>4. Veins, arteries and capillaries are the three types of blood vessels.<br>5. Deoxygenated blood is blood where most of the oxygen has already been transferred to the rest of the body<br>6. To know that capillaries are the smallest blood vessels in the body and it is here that the exchange of water, nutrients, oxygen and carbon dioxide takes place |

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| | 8. All living things breathe, eat, grow, move, reproduce and have senses. Non-living things do not eat, grow, breathe, move and reproduce. They do not have senses.<br>9. Amphibians live the first part of their life in water and the last part on the land<br>10. Reptiles are cold blooded animals and lay eggs. They live in land and in water<br>11. All mammals have hair, lungs, are warm blooded and can live on land or in water. Most mammals give birth to live babies.<br>12. A fish uses its gills to breathe, they have scales and lay soft eggs.<br>13. Birds lay eggs and have a beak, they all lay eggs but not all birds can fly | 4. The oesophagus is a muscular tube which moves food from the mouth to the stomach.<br>5. The stomach is an organ in the digestive system where food is broken down with stomach acid and by being churned around.<br>6. The small intestine where nutrients are absorbed into the body.<br>7. The large intestine is part of the intestine where water is absorbed from remaining waste food. Faeces are formed in the large intestine.<br>8. Incisors bite and cut. Canines tear and rip. Molars grind and premolars hold and crush food. Some people have wisdom teeth but they have no function now. | |
| Agreed Scientific Enquiry Skills (Disciplinary Knowledge) | • Classify and name a range of animals by amphibian, reptile, mammal, fish and birds<br>• Classify animals by what they eat (carnivore, herbivore and omnivore)<br>• I can name the parts of the human body that can be seen and link them to our senses.<br>• Explain the basic stages in a life cycle for animals (including humans)<br>• Explain why exercise, balanced diet and good hygiene are important for humans<br>• Explain what animals and humans need in order to survive<br>• I can sort living things and non-living things | • Identify that animals, including humans, need the right amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat<br>• Identify and name parts of the human digestive system and know the functions of the organs involved<br>• Identify different types and functions of human teeth<br>• Identify that humans and some other animals have skeletons and muscles for support, protection and movement<br>• Construct and interpret a variety of food chains, identifying producers, predators and prey | • Demonstrate how to create a timeline to indicate stages of growth in humans<br>• Describe the changes as humans develop to old age<br>• *Describe the changes during puberty (taught through PSHE)*<br>• Identify and name the main parts of the human circulatory system, and describe functions of the heart, blood vessels and blood<br>• *Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (taught through PSHE)*<br>• Describe the ways in which nutrients and water are transported within animals, including humans |

| 5 strands of Scientific Enquiry |  |  |  |  |  |
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| Year 1 and 2 | Do amphibians have more in common with reptiles or fish? | What are the names of the | Which offspring belongs to | How does my height change over the year? | |

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| | | | parts of the body we can see? | which animal? | | | |
| Year 3 and 4 | | In our class, are omnivores taller than vegetarians? | What are the names for all the organs involved in the digestive system? | How can we organise teeth into? groups? | How does an eggshell change over time in coke? | | |
| Year 5 and 6 | | | Can you identify the stages in the human life cycle? | Which organs of the body make up the circulation system, and where are they found? | | How is pulse rate affected by exercise? | Why do people get grey/white hair? Is it associated with age? |
| Agreed Vocabulary | *EYFS vocab: head, tummy, legs, arms, feet, toes, fingers, eyes, nose, ears, mouth, eyebrows, eyelashes, hibernation, animals, nocturnal, polar bear, seal, giraffe, elephant*<br><br>Amphibians, birds, fish, mammals, reptiles, carnivore, herbivore, omnivore, life cycle, offspring, live young, living, dead, never living, Senses – sight, hearing, touch, taste, smell<br>Parts of the body – head, ear, eye, nose, mouth, teeth, shoulder, elbow, hand, fingers, thumb, knee, leg, foot, toes<br>Adult, develop, young, diet, exercise, germs, hygiene, nutrition | | Healthy, nutrients, energy, saturated fats, unsaturated fats, vertebrate, invertebrate, muscles, tendons, joints, digest, oesophagus, stomach, small intestine, large intestine, rectum, herbivore, carnivore, omnivore, producer, predator, prey, incisors, canines, molars, premolars | | | Circulatory, heart, blood vessels, veins, arteries, oxygenated, deoxygenated, valve, exercise, nutrients | |
| **Living Things and their Habitats** | | | | | | | |

| This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes. | | | |
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| | Key Stage 1 | Lower Key Stage 2 | Upper Key Stage 2 |
| Year and Term | Year A Autumn Term 1 (content highlighted in blue) and Year B Spring Term 1 | Year A – Spring Term 1 | Year A and C – Spring Term 1 (Year 5 content – this content is highlighted in blue)<br>Spring Term 2 (Year 6 content) |
| Agreed Core Knowledge (Substantive Knowledge) | *EYFS Prior Knowledge: Show care and concern for living things and the environment.*<br><br>1. Different habitats are suited to different plants and animals. E.g. a forest, ocean, desert, woodland.<br>2. Habitats provide for the basic needs of the animals and plants that live there, such as food and shelter<br>3. A food chain shows how animals get food from plants and other animals.<br>4. There are different sources of food e.g. crops, plants, trees, meat and milk from animals.<br>5. Mammals, reptiles, amphibians, birds, fish can be found in habitats which are suited to them.<br>6. Microhabitats are small habitats where mini beasts may live e.g. under a rock, under leaves<br>7. Living things depend on each other to survive.<br>8. Everything is either living, dead or has never been alive.<br>9. There are 7 characteristics of living things: movement, respiration, sensitivity, growth, reproduction, excretion and nutrition. These can be remembered using the acronym: MRS GREN | 1. To stay alive and healthy, all living things need certain conditions that let them carry out the seven life processes: movement, respiration, sensitivity, growth, reproduction, excretion, nutrition<br>2. Changes to the environment can be natural or caused by humans. Changes to an environment can have positive or negative effects.<br>3. Plants and animals rely on the environment to given them everything they need, so when habitats change, it can be very dangerous to the plants and the animals that live there.<br>4. Animals and plants can be grouped in different ways based upon their characteristics.<br>5. Difference between vertebrates and invertebrates. | 1. Humans develop inside their mothers and are dependent on their parents for many years until they are old enough to look after themselves<br>2. Amphibians such as frogs are laid in eggs then once hatched, go through many changes until they become adults<br>3. Some animals such as butterflies go through metamorphosis to become an adult<br>4. Birds are hatched from eggs and are looked after by their parents until they are able to live independently<br>5. Most plants contain both the male sex cell (pollen) and female sex cells (ovules) but most plants can't fertilise themselves<br>6. Wind and insects help to transfer pollen to a different plant<br>7. The pollen from the stamen of one plant is transferred to the stigma of another<br>8. Some plants such as strawberry plants and potato plants use asexual reproduction to create a new plant. They are identical to the parent plant<br>9. Scientists, called Taxonomists, sort and group living things according to their similarities and differences<br>10. The Linnaeus system is used for classifying all living things<br>11. A key is a series of questions about the characteristics of living things. It is used to identify a living thing or decide which group it belongs to by answering 'yes' or 'no' questions<br>12. Microorganisms are viruses, bacteria, moulds or yeast. Some animals or plants are also microorganisms<br>13. Microorganisms are very tiny living things and can only be seen using a microscope. They |

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| | | | | can be found in or on our bodies, in the air, in water and on objects around us | |
| Agreed Scientific Enquiry Skills (Disciplinary Knowledge) | • Explain how a specific habitat provides for the basic needs of living things (plants and animals) and can match them to their habitat<br>• Name some different sources of food for animals and can explain a simple food chain<br>• Identify and name animals and plants in their habitats including microhabitats<br>• Classify things by living, dead or never lived | | • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment<br>• Recognise that living things can be grouped in a variety of ways<br>• Recognise that environments can change and that this can sometimes pose dangers to living things | | • Discuss the life cycle of different living things e.g. mammal, amphibian, insect and bird<br>• Explain the differences between life cycles<br>• Explain the life process of reproduction in some plants and animals<br>• 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<br>• Give reasons for classifying plants and animals based on specific characteristics |
| 5 Strands of Scientific Enquiry |  | |  |  |  |  |
| Year 1 and 2 | Is the food chain for a mammal the same as a food chain for a bird? | | How would you group plants and animals based on what habitat you would find them in? | How would you group things to show which are living, dead, or have never been alive? | | | How are the animals and their habitats different depending on the climate? |
| Year 3 and 4 | | | How would you group, identify and name a variety of living things in your local and wider environment? | | How does the variety of invertebrates on the Stray change over the year? | | Why are people cutting down the rainforests and what effect does that have? |
| Year 5 and 6 | Which is the most common invertebrate on the Stray? | | How would you classify plants and animals based on | | How does a bean change as it germinates? | | What are the differences between the lifecycle of an |

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| | | specific characteristics? | | | insect and a mammal? |
| Agreed Vocabulary | *EYFS vocab: cold lands, hot lands, grow, lifecycle*<br><br>Living, dead, habitat, microhabitat, energy, food chain, predator, prey, woodland, pond, desert, urban | Vertebrates, invertebrates, fish, amphibians, reptiles, birds, mammals, snails, slugs, worms, spiders, insects, environment, habitats | | Mammal, reproduction, insect, amphibian, bird offspring, asexual reproduction, fertilise, gestation, life cycle, metamorphosis, pollination<br>Classification, vertebrates, invertebrates, microorganisms, amphibians, reptiles, mammals, insects | |
| **Plants**<br>This concept involves becoming familiar with different types of plants, their structure and reproduction | | | | | |
| | Key Stage 1 | Lower Key Stage 2 | | Upper Key Stage 2 | |
| Year and Term | Year A Summer Term | Year A Spring Term 2 and Summer 1 | | | |
| Agreed Core Knowledge (Substantive Knowledge) | *EYFS Prior Knowledge: Talk about and make observations of the plants I have seen.*<br><br>1. A wild plant seed grows where it falls. It doesn't need to be planted or cared for as it grows<br>2. Garden plants are plants that people chose to grow in their gardens<br>3. A deciduous tree loses its leaves each year<br>4. An evergreen tree keeps its green leaves all year round, even in the winter<br>5. Roots take in water and nutrients from the soil and keep the plant in the ground. The stem holds the plant up and carries the water and nutrients from the roots to the leaves and flowers<br>6. Every plant needs water and sunlight to grow and survive<br>7. All plants need the right temperature to grow well<br>8. Plants are living things that use sunlight to help the plant make its own food<br>9. Flowers attract insects and birds<br>10. Petals are the colourful part of the flower<br>11. Fruit contains the plant's seeds<br>12. Seeds and bulbs grow into new plants<br>13. Seeds and bulbs can germinate and sprout underground without sunlight because they have a store of food inside the bulb/seed | 1. Plants are producers and make their own food. Roots take in water and nutrients from the soil and keep the plant in the ground<br>2. The stem holds the plant up and carries the water and nutrients from the roots to the leaves and flowers<br>3. Leaves absorb sunlight and carbon dioxide to help the plant to make its own food<br>4. Flowers attract insects and birds<br>5. Plants need: water, light, nutrients from the soil, air and room to grow<br>6. Different plants vary in how much of these things they need e.g. cacti can survive in areas with little water, whereas water lilies need to live in water<br>7. Seeds/bulbs require the right conditions to germinate and grow. Seeds contain enough food for the plant's initial growth<br>8. Roots absorb water from the soil, the stem transports water to the leaves, water evaporates from the leaves, this evaporation causes more water to be sucked up the stem<br>9. Seeds can be dispersed in the following ways: dropping, carrying, water, shaking, eating and bursting | | | |

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| Agreed Scientific Enquiry Skills (Disciplinary Knowledge) | • Name a variety of common wild and garden plants, including deciduous and evergreen trees<br>• Name the petal, stem, leaves and root of a plant and name the roots, trunk, branches and leaves of a tree<br>• Explain how seeds and bulbs grow into plants and know what plants need in order to grow and stay healthy | | • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers<br>• 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<br>• Investigate the way in which water is transported within in plants<br>• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal | | |
| 5 Strands of Scientific Enquiry |  | |  |  |  |  |
| Year 1 and 2 | Do cress seeds grow quicker inside or outside? | | How would you sort a variety of common plants? | How do plants change as they grow? | Do bigger seeds grow into bigger plants? | Are there plants that are in flower in every season? What are they? |
| Year 3 and 4 | Which conditions help seeds germinate faster? | | How many ways can you group a seed collection? | What are the stages in a plant life cycle? | What colour flowers do pollinating insects prefer? | |
| Year 5 and 6 | | | | | | |
| Agreed Vocabulary | *EYFS vocab: plant, seed, soil, sun, water, grow*<br><br>Deciduous, evergreen, trees, leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem, seeds, bulbs, water, light, temperature, growth | | Air, light, water, nutrients, soil, reproduction, transportation, dispersal, pollination, flower | | | |

| **Evolution and Inheritance**<br>This concept involves understanding that organisms come into existence, adapt, change and evolve and become extinct | | | |
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| | Key Stage 1 | Lower Key Stage 2 | Upper Key Stage 2 |
| Year and Term | | | Year A and C – Summer Term 2 |
| Agreed Core Knowledge (Substantive | | | 1. Evolution is the process by which living things gradually change over time |

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| Knowledge) | | | | 2. Fossils provide information about living things from millions of years ago<br>3. Organisms reproduce and offspring have similar characteristic patterns<br>4. Over time the characteristics that are most suited to the environment become increasingly common<br>5. Organisms best suited to their environment are more likely to survive long enough to reproduce<br>6. Variation exists with a population (and between offspring of some plants)<br>7. Charles Darwin is known for his theory of evolution by natural selection – this was recorded in his book The Origin of the Species | |
| Agreed Scientific Enquiry Skills (Disciplinary Knowledge) | | | | • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago<br>• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents<br>• Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution<br>• Research the work of a palaeontologist e.g. Charles Darwin<br>RESEARCH USING SECONDARY SOURCES | |
| 5 Strands of Scientific Enquiry |  |  |  |  |  |
| Year 1 and 2 | | | | | |
| Year 3 and 4 | | | | | |

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| Year 5 and 6 | What is the most common eye colour in our class? | Can you compare the skeletons of apes, humans, and Neanderthals – how are they similar, and how are they different?<br>Can you classify these observations into evidence for the idea of evolution, and evidence against? | | | What happened when Charles Darwin visited the Galapagos islands? |
| Agreed Vocabulary | | | | Fossils, adaptation, evolution, characteristics, reproduction, genetics, | |

## Chemistry

### Materials

This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered of changed

| | Key Stage 1 | Lower Key Stage 2 | Upper Key Stage 2 |
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| Year and Term | Year B Summer Term | Year B Autumn 1 **States of Matter** and Year B Autumn 2 **Rocks** | Year B Autumn Term |
| Agreed Core Knowledge (Substantive Knowledge) | **Use of Everyday Materials**<br>*EYFS Prior Knowledge: Find similarities and differences, patterns and change.*<br><br>1. Objects are things that you can touch or see<br>2. Objects are made from different materials<br>3. Objects feel and look different based on the materials they are made from<br>4. Some materials that objects are made from are: glass, wood, paper, metal, water, rock and plastic.<br>5. Some words to describe materials are: shiny, soft, rough, bendy, hard and absorbent<br>6. Materials can be changed by physical force<br>Suitability means having the properties which are right for a specific purpose e.g. metal, wood and plastic are all suitable materials for spoons | **States of Matter**<br>1. Solids, liquids and gases are described by observable properties<br>2. Particles in a solid are close together and cannot move. They can only vibrate<br>3. Particles in a liquid are close together but can move around each other easily<br>4. Particles in a gas are spread out and can move around very quickly in all directions<br>5. Heating causes solids to melt into liquids and liquids evaporate into gases<br>6. Cooling causes gases to condense into liquids and liquids to freeze into solids<br>7. When water and other liquids reach a certain temperature they change state into a solid or gas. The temperatures that these changes happen at are called the boiling, melting or freezing point<br>8. Condensation and evaporation occur within the water cycle: water from lakes, puddles, rivers and seas is evaporated by | **Properties and Change of Materials**<br>1. Different materials are used for particular jobs based on their properties: electrical conductivity, flexibility, hardness, insulators. Magnetism, solubility, thermal conductivity, transparency<br>2. A solution is made when solid particles are mixed with liquid particles<br>3. Materials that will dissolve are known as soluble<br>4. Materials that won't dissolve are known as insoluble<br>5. A suspension is when particles don't dissolve<br>6. Reversible changes, such as mixing and dissolving solids and liquids together can be reversed by: sieving – smaller materials are able to fall through the holes in the sieve, separating them from their larger particles. Filtering – the solid particles will get caught in the filter paper but the liquid will be able to get through. Evaporating – the liquid |

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| | | the sun's heat, turning it into water vapour. This water vapour rises, then cools down to form water droplets in clouds (condensation). When the droplets get too heavy, they fall back to Earth as rain, sleet, hail or snow (precipitation)<br>**Rocks and Fossils**<br>1. Igneous rock is rock that has been formed from magma or lava<br>2. Sedimentary rock is rock that has been formed by layers of sediment being pressed down hard and sticking together, you can see layers of sediment in the rock<br>3. Metamorphic rock is rock that started out as igneous rock but changed due to being exposed to extreme heat or pressure<br>4. Fossils form when layers of rock cover it. Only hard parts of the creature remain e.g. bones, shells and teeth<br>5. As erosion and weathering take place, eventually the fossil becomes exposed<br>6. Soil is the uppermost layer of the Earth. It is a mixture of different things: minerals, air, water, organic matter (including living and dead plants and animals) | changes into a gas, leaving the solid particles behind<br>7. Some changes can be reversed and some cannot<br>8. Irreversible changes often result in a new product being made from the old materials (reactants). For example: burning wood produces ash. Mixing vinegar and milk produces casein plastic |
| Agreed Scientific Enquiry Skills (Disciplinary Knowledge) | • Name the materials an object is made from<br>• Name everyday materials then use their properties to compare and group them<br>• Explain how materials can be changed by squashing, bending, twisting and stretching<br>• Explain how suitable materials are and that they are used for various different uses | **States of Matter**<br>• Compare and group materials together, according to whether they are solids, liquids or gases<br>• 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<br>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature<br>**Rocks and Fossils**<br>• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties | • 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<br>• Some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution<br>• Use knowledge of solids, liquids and gases and decide how mixtures might be separated, including through filtering, sieving and evaporating<br>• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic<br>• Demonstrate that dissolving, mixing and changes of state are reversible changes |

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| | | | • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. An animal dies, it gets covered with sediments which eventually become rock<br>• Recognise that soils are made from rocks and organic matter | | • 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 | |
| 5 Strands of Scientific Enquiry | |  |  |  |  |  |
| Year 1 and 2 | | Which material would be best for the roof of the little pig's house? | We need to choose a material to make an umbrella. Which materials are waterproof?<br><br>Which materials are shiny and which are dull? | What happens to shaving foam over time? | Is there a pattern in the types of materials that are used to make objects in a school?<br><br>How does amount of water affect the strength of a kitchen towel? | Which materials can be recycled? |
| Year 3 and 4 | | How does the mass of a block of ice affect how long it takes to melt? / Which soil absorbs the most water? | Can you group materials and objects into solids, liquids, and gases? | How does the level of water in a glass change when left on the windowsill? / How does tumbling change a rock over time? | | Who was Mary Anning and what did she discover? |
| Year 5 and 6 | | **Which material is most reflective?** | Can you group these materials based on whether they are transparent or not? | How does a sugar cube change as it is put in a glass of water? | | **What are smart materials and how can they help us?** |
| Agreed Vocabulary | *EYFS vocab: soft, hard, melt, rough, smooth*<br><br>Wood, plastic, glass, paper, water, metal, rock, hard, soft, bendy, rough, smooth, stretchy, stiff, shiny, dull, waterproof, absorbent, opaque, transparent, brick, paper, fabrics, squashing, bending, twisting, elastic foil | | **States of Matter:** solid, liquid, gas, evaporation, condensation, precipitation, particles, boiling point, freezing point, temperature<br>**Rocks and Fossils:** igneous, sedimentary, metamorphic, fossils, soils, sandstone, granite, marble, pumice, crystals, absorbent | | Hardness, solubility, transparency, conductivity, magnetic, filter, evaporation, dissolving, mixing, reversible, irreversible | |
| Physics | | | | | | |
| **Movement, Forces and Magnets** | | | | | | |

| This concept involves understanding what causes movement | | | |
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| | Key Stage 1 | Lower Key Stage 2 | Upper Key Stage 2 |
| Year and Term | | Year B Summer 1 | Year B Summer 1 |
| Agreed Core Knowledge (Substantive Knowledge) | | 1. Different surfaces create different amounts of friction.<br>2. The amount of friction created by an object moving over a surface depends on the roughness of the surface and the object and the force between them<br>3. A force acts between two surfaces or object that are moving, or trying to move, across each other. Magnetic force can act at distance<br>4. Magnets produce a magnetic force that pulls certain objects towards it<br>5. Objects which are attracted to a magnet are magnetic<br>6. Objects containing iron, nickel or cobalt metals are magnetic<br>7. North and South poles are found at different ends of a magnet<br>8. Repulsion is a force that pushes objects away. For example, when a north pole is placed near the north pole of another magnet, the two poles repel (push aware from each other) | 1. Gravity is a pulling force exerted by the Earth (or anything else that has mass)<br>2. Earth's gravitational pull is the pull that Earth exerts on an object, pulling it towards Earth's centre. It is Earth's gravitational pull which keeps us on the ground<br>3. Unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object<br>4. Isaac Newton is famously thought to have developed his theory of gravity when he saw an apple fall to the ground from a tree<br>5. Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way<br>6. Friction is a force against motion caused by two surfaces rubbing against each other<br>7. Some objects require large forces to make them move; gears, pulleys and levers can reduce the force needed to make things move |
| Agreed Scientific Enquiry Skills (Disciplinary Knowledge) | | • Compare how things move on different surfaces<br>• Notice that some forces need contact between two objects but magnetic forces can act at a distance<br>• Observe how magnets attract or repel each other and attract some materials and not others<br>• 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<br>• Describe magnets as having two poles<br>• Predict whether two magnets will attract or repel each other, depending on which poles are facing | • Explain that unsupported objects fall towards Earth because the force of gravity acting between the Earth and the falling object<br>• Identify the effects of air resistance, water resistance and friction that act between moving surfaces<br>• Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect |

| 5 Strands of Scientific Enquiry |  |  |  |  |  |
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| Year 1 and 2 | | | | | |
| Year 3 and 4 | Which magnet is strongest? | Which materials are magnetic? | If we magnetise a pin, how long does it stay magnetised for? | Does the size and shape of a magnet affect how strong it is? | How does a compass work? |
| Year 5 and 6 | How does the surface area of an object affect the time it takes to sink? | Can you label and name all the forces acting on the objects in our classroom scenarios? | How long does a pendulum swing for before it stops? | Do all objects fall through water in the same way? | How do submarines sink if they are full of air? |
| Agreed Vocabulary | | Magnetic, force, contact, attract, repel, friction, poles, push, pull, repulsion | | Air resistance, water resistance, gravity, friction, Newton, gears, pulley, levers, mass, weight | |

| **Earth and Space**<br>This concept involves understanding what causes seasonal changes, day and night | | | |
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| | Key Stage 1 | Lower Key Stage 2 | Upper Key Stage 2 |
| Year and Term | Year A Spring 2 Movement of Earth and Space and Seasonal Changes (taught across Year A to see the changes of the seasons) | | Year A and C – Autumn Term |
| Agreed Core Knowledge (Substantive Knowledge) | *EYFS Prior Knowledge: Talk about and make observations of the seasons and how they change e.g. noticing the leaves falling from the trees in the autumn*<br><br>1. There are four seasons: spring, summer, autumn and winter<br>2. The months of the year in each season are:<br>Spring: March, April May<br>Summer: June, July, August<br>Autumn: September, October, November<br>Winter: December, January, February<br>3. There are lots of different types of weather for example, rain, wind, snow, cloud etc. | | 1. The moon orbits Earth in an oval-shaped path while spinning on its axis.<br>2. At various times in a month, the moon appears to be different shapes because as the moon rotates round Earth, the sun lights up different parts of it.<br>3. Earth rotates (spins) on its axis. It does a full rotation once in every 24 hours.<br>4. At the same time the Earth is rotating it is also orbiting (revolving) around the sun. It takes more than 365 days to orbit the sun.<br>5. Daytime occurs when the side of the Earth is facing towards the sun. |

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| | 4. Days are longer and warmer in the summer<br>5. Days are shorter and colder in the winter | | | 6. Night occurs when the side of the Earth is facing away from the sun.<br>7. The sun does not move (even though it appears to)<br>8. The work and ideas of many astronomers (such as Copernicus) combined over many years before the idea of the heliocentric model was developed.<br>9. Galileo's work on gravity allowed astronomers to understand how planets stayed in orbit. | |
| Agreed Scientific Enquiry Skills (Disciplinary Knowledge) | • Observe the changes over the seasons<br>• Observe and describe weather associated with the seasons and how day length varies<br><br>*Notice and describe how things move, using simple comparisons such as faster and slower (non-statutory)*<br><br>*Compare how different things move (non-statutory)* | | | • Describe the movement of the Earth and the other planets relative to the sun in the solar system<br>• Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky<br>• Describe the movement of the moon relative to the Earth<br>• Describe the sun, Earth and moon as approximate spherical bodies | |
| 5 Strands of Scientific Enquiry |  |  |  |  |  |
| Year 1 and 2 | In which season does it rain the most? | How would you group things based on which season you are most likely to see them in? | How does the colour of leaves change throughout the year? | Does wind always blow the same way? | |
| Year 3 and 4 | | | | | |
| Year 5 and 6 | How does the length of daylight hours change in each season? | How could you organise all the objects in the solar system into groups? | Can you observe and identify all the phases in the cycle of the Moon? | Is there a pattern between the size of a planet and the time it takes to travel around the Sun? | How have our ideas about the solar system changed over time? |

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| Agreed Vocabulary | *EYFS Vocabulary: Summer, spring, autumn, winter, cold, hot, rain, snow sun, weather, push, pull*<br><br>Summer, spring, autumn, winter, sun, day, moon, night, light, dark | | Sun, star, moon, planet, sphere, spherical bodies, satellite, orbit, rotate, axis, Geocentric Model, Heliocentric Model, astronomer |
| **Light and Seeing**<br>This concept involves understanding how light and reflection affect sight | | | |
| | Key Stage 1 | Lower Key Stage 2 | Upper Key Stage 2 |
| Year and Term | | Year B Spring Term 1 | Year B Spring Term 1 |
| Agreed Core Knowledge (Substantive Knowledge) | | 1. There must be light for us to see. Without light it is dark. We need light to see things even shiny things<br>2. Beams of light bounce off some materials (reflection)<br>3. The pupils control the amount of light entering the eyes. If too much light enters, then it can damage the retina.<br>4. To help protect the eyes, you can wear a hat with a wide brim and sunglasses with a UV rating<br>5. A shadow is caused when light is blocked by an opaque object. A shadow is larger when an object is closer to the light source. This is because it blocks more of the light | 1. Light travels in straight lines<br>2. Light from the sun travels in a straight line and hits an object. The light ray is then reflected off the objects and travels in a straight line to our eyes, enabling us to see the object<br>3. We need light to be able to see things. Light waves travel out from sources of light in straight lines. These lines are often called rays or beams of light<br>4. A shadow is always the same shape as the object that casts it. This is because when an opaque object is in the path of light travelling from a light source, it will block the light rays that hit it, while the rest of the light can continue travelling |
| Agreed Scientific Enquiry Skills (Disciplinary Knowledge) | | • Recognise that I need light in order to see things and that dark is the absence of light<br>• Notice that light is reflected from surfaces<br>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes<br>• Recognise that shadows are formed when the light from a source is block by an opaque object<br>• Find patterns in the way that the size of shadows change | • Recognise that light appears to travel in straight lines<br>• 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<br>• 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<br>• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them |

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| 5 Strands of Scientific Enquiry |  |  |  |  |  |
| Year 1 and 2 | | | | | |
| Year 3 and 4 | Which pair of sunglasses will be best at protecting our eyes? | How would you organise light sources into natural and artificial sources? | When is our classroom the darkest? | How does a shadow change depending on the time of day? | How does the sun make light? |
| Year 5 and 6 | What happens to light when it is shone through water? How is this affected by putting glitter, salt or talc in the water? | | How does my shadow change over the day? | Is there a pattern to how bright it is in school over the day? And, if there is a pattern, is it the same in every classroom? | How do our eyes adapt to different conditions? |
| Agreed Vocabulary | | Light, shadows, mirror, reflective, dark, reflection | | Refraction, reflection, light, spectrum, rainbow, colour, light source, incident ray, reflected ray, the law of reflection, visible spectrum, prism, shadow, transparent, translucent, opaque | |

| **Sound and Hearing**<br>This concept involves understanding how sound is produced, how it travels and how it is heard | | | |
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| | Key Stage 1 | Lower Key Stage 2 | Upper Key Stage 2 |
| Year and Term | | Year A and C Autumn Term | |
| Agreed Core Knowledge (Substantive Knowledge) | | 1. Sound is a type of energy<br>2. Sounds are created by vibrations. The louder the sound, the bigger the vibration<br>3. Sound can travel through solids, liquids and gases<br>4. Inside your ear, the vibrations hit the eardrum and are then passed to the middle and then the inner ear. They are then changed into electrical signals and send to your brain. Your brain tells you that you are hearing a sound<br>5. Pitch is a measure of how high or low a sound is. A whistle being blown creates a high-pitched sound. A rumble of thunder is an example of a low-pitched sound<br>6. The size of the vibration is called the amplitude. Louder sounds have a larger | |

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| | | amplitude and quieter sounds have a smaller amplitude<br>7. When sound vibrations spread out over a distance, the sound becomes quieter, just like ripples in a pond | | | |
| Agreed Scientific Enquiry Skills (Disciplinary Knowledge) | | • Identify how sounds are made, associating some of them with something vibrating<br>• Recognise that vibrations from sounds travel through a medium to the ear<br>• Find patterns between the pitch of a sound and features of the object that produced it<br>• Find patterns between the volume of a sound and the strength of the vibrations that produced it<br>• Recognise that sounds get fainter as the distance from the sound sources increases | | | |
| 5 Strands of Scientific Enquiry |  |  |  |  |  |
| Year 1 and 2 | | | | | |
| Year 3 and 4 | How does the volume of a drum change as you move further away from it? | Which material is best to use for muffling sound in ear defenders? | When is our classroom the quietest? | Is there a link between how loud it is in school and the time of day? If there is a pattern, is it the same in every area of the school? | |
| Year 5 and 6 | | | | | |
| Agreed Vocabulary | | Vibration, sound wave, volume, amplitude, pitch, ear, particles, distance, soundproof, absorb sound, vacuum, eardrum, medium | | | |
| **Electrical Circuits** | | | | | |

| This concept involves understanding circuits and their role in electrical appliances | | | |
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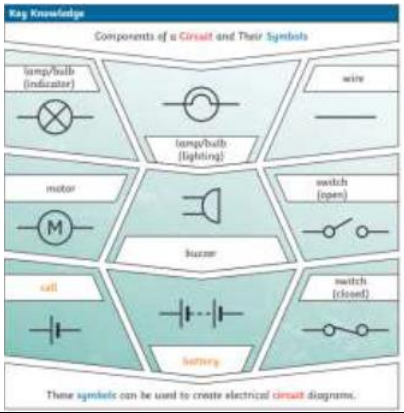
| | Key Stage 1 | Lower Key Stage 2 | Upper Key Stage 2 |
| Year and Term | | Year B and D Summer Term | Year B and D Summer Term |
| Agreed Core Knowledge (Substantive Knowledge) | | 1. A source of electricity (mains or batter) is needed for electrical devices to work<br>2. Electricity sources push electricity round a circuit<br>3. Electricity can only flow around a complete circuit that has no gaps<br>4. There must be wires connected to both the positive and negative end of the power supply/battery<br>5. Switches can be used to open or close a circuit. When off, a switch 'breaks' the circuit to stop the flow of electricity. When on, the switch 'completes' the circuit and allows the electricity to flow<br>6. A conductor of electricity is a material that will allow electricity to flow through it<br>7. Metals are good conductors<br>8. Materials that are electrical insulators do not allow electricity to flow through them. Wood, plastic and glass are good insulators | 1. More batteries or a higher voltage create more power to flow through the circuit. Shortening the wires means the electrons have less resistance to flow through<br>2. Fewer batteries or a lower voltage give less power to the circuit<br>3. More buzzers or bulbs mean the power is shared by more components<br>4. Lengthening wires means the electrons gave to travel through more resistance<br>5. Recognise and draw the symbols below:<br>  |
| Agreed Scientific Enquiry Skills (Disciplinary Knowledge) | | • Identify common appliances that run on electricity<br>• Construct a simple series circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers<br>• Identify whether or not a lamp will light in a series circuit, based on whether or not the lamp is part of a complete loop with a battery<br>• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit | • Associate the brightness of a lamp or the volume of a buzzer with the number of and voltage of cells used in a circuit<br>• 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<br>• Use recognised symbols when representing a simple circuit in a diagram |

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| | | • Recognise some common conductors and insulators and associate metals with being good conductors | | | |
| 5 Strands of Scientific Enquiry |  |  |  |  |  |
| Year 1 and 2 | | | | | |
| Year 3 and 4 | Which metal is the best conductor of electricity? | Can you identify and sort electrical devices based on where the electricity comes from? | How long does a battery light a torch for? | Which room has the most electrical sockets in a house? | How has electricity changed the way we live? |
| Year 5 and 6 | How does the voltage of the batteries in a circuit affect the brightness of the lamp? | | Does the temperature of a light bulb go up the longer it is on? | How does brightness of bulb change as the battery runs out? | How has our understanding of electricity changed over time? |
| Agreed Vocabulary | | Cells, wires, bulbs, switches, buzzers, battery, circuit, series, conductors, insulators, flow, appliances, devices, energy source | | Cells, wires, bulbs, switches, buzzers, battery, circuit, symbol, cell/battery, current, amps, voltage, resistance, electrons, series circuit, conductors, insulators, amps, volts | |