# St. Peter's CE Primary, Farnworth


***'Learn, Sparkle & Shine.'***

## SCIENCE CURRICULUM: YEAR 5

## 2025-2026

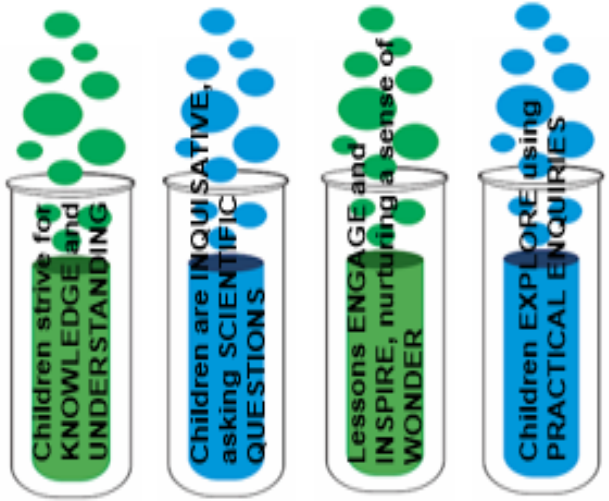
**Psalm 111:2:** "Great are the works of the Lord, studied by all who delight in them".

# St Peter's C of E Primary School

## Our Vision...

- Children at St Peter's **understand** what Science is, what it is for and why we do it. They acquire **knowledge capital.**
- They are **inquisitive**, and they are encouraged to **question** and **investigate.**
- They can explain the importance of science in the world. They have **aspiration** for the future.
- Children demonstrate an **enjoyment** of Science, being able to **talk** and **discuss** their thoughts, feelings and opinions using scientific **vocabulary**.
- The use of explicit **modelling** of concepts features prominently within **progressive** sequences of lessons.
- The children **engage** in science and **demonstrate working scientifically skills** through the **five strands of enquiry**.
- At St Peter's it is understood that **working scientifically** skills are taught alongside the **knowledge content** of the curriculum.


## Science 'Learns, Sparkles and Shines' at St. Peter's when...





**Proverbs 18:15:** "An intelligent heart acquires knowledge, and the ear of the wise seeks knowledge".

# Curriculum Overview:

| | Autumn 1-2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
|---|---|---|---|---|---|
| **Unit of Study and Key objectives (Substantive Knowledge)** | **CHEMISTRY:**<br>**Properties and Changes of Materials**<br><br>• 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><br>• Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.<br><br>• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.<br><br>• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.<br><br>• Demonstrate that dissolving, mixing and changes of state are reversible changes.<br><br>• 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. | **PHYSICS:**<br>**Forces**<br><br>• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object<br><br>• Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.<br><br>• Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect. | **PHYSICS:**<br>**Earth and Space**<br><br>• Describe the movement of the Earth and other planets relative to the sun in the solar system.<br><br>• Describe the movement of the moon relative to the Earth.<br><br>• Describe the sun, Earth and moon as approximately spherical bodies<br><br>• Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. | **BIOLOGY:**<br>**Living Things and Their Habitats (Life-Cycles)**<br><br>• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.<br><br>• Describe the life process of reproduction in some plants and animals.<br><br>• Recap classification of animals from year 1 with the addition of: w*hales, dolphins (sea mammals) and kangaroos (marsupial) echidna and duckbill platypus (as egg laying mammals.)*.<br><br>• Reproduction and life-cycles of animals such as: *salamander, kangaroo, butterfly, penguin*<br><br>• Reproduction in plants including trees such as *sycamore and cherry tree, elderflower, carnation and hyacinth potato, ginger, allium: garlic and strawberry plants.* | **BIOLOGY:**<br>**Animals, Including Humans (Puberty and Human Life-Cycle)**<br><br>• Describe the changes as humans develop to old age.<br><br>(Humans only) |

# Definitions within Science:

**Science:** the systematic study of the structure and behaviour of the physical and natural world through observation, experimentation and the testing of theories against evidence obtained.

**Physics:** the science of matter, energy and their interactions.

**Chemistry:** the science of explaining the composition, structure and properties of substances and the transformations they undergo.

**Biology:** the science explaining living organisms and their vital processes.

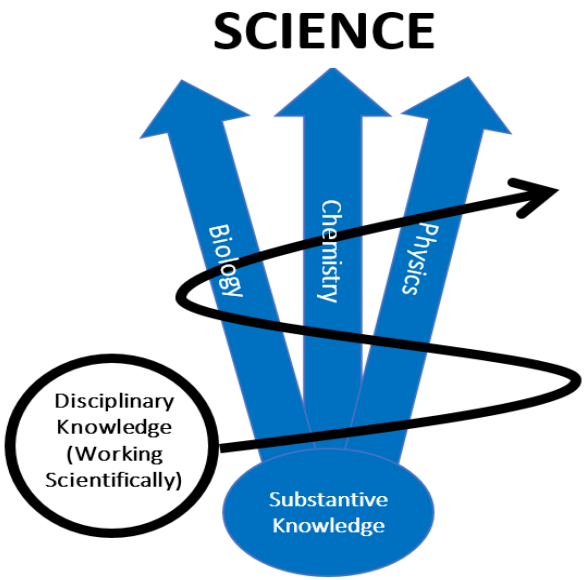
**Geology*:** the science that deals with the Earth's physical structure and substance, its history, and the processes that act on it.

**Working Scientifically:** the understanding of the nature, processes and methods of science. Includes the five strands of science enquiry: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing; and researching using secondary sources.

**Scientific Enquiry:** the processes of studying and investigating scientific ideas using the five strands of enquiry.

***Note: Geology is not identified as a separate strand of Science within the National Curriculum (2014). Geology is taught as part of the subject of Geography, but has significant Science overlap (Examples: the water cycle, rock formation etc.).**

# Disciplinary Knowledge: Upper Key Stage 2




**Working scientifically** is an integral strand of scientific learning within the Primary Science national Curriculum (2014). It is integrated throughout the wider substantive knowledge strands of **Biology**, **Chemistry** and **Physics**, rather than being discrete and separate from them. The Curriculum at St. Peter's CE Primary School reflects this.

## How we 'work scientifically':


## Working Scientifically Objectives (Y5-6):

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- Using test results to make predictions to set up further comparative and fair tests
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- Identifying scientific evidence that has been used to support or refute ideas or arguments.

# The National Curriculum: Non-Statutory Guidance

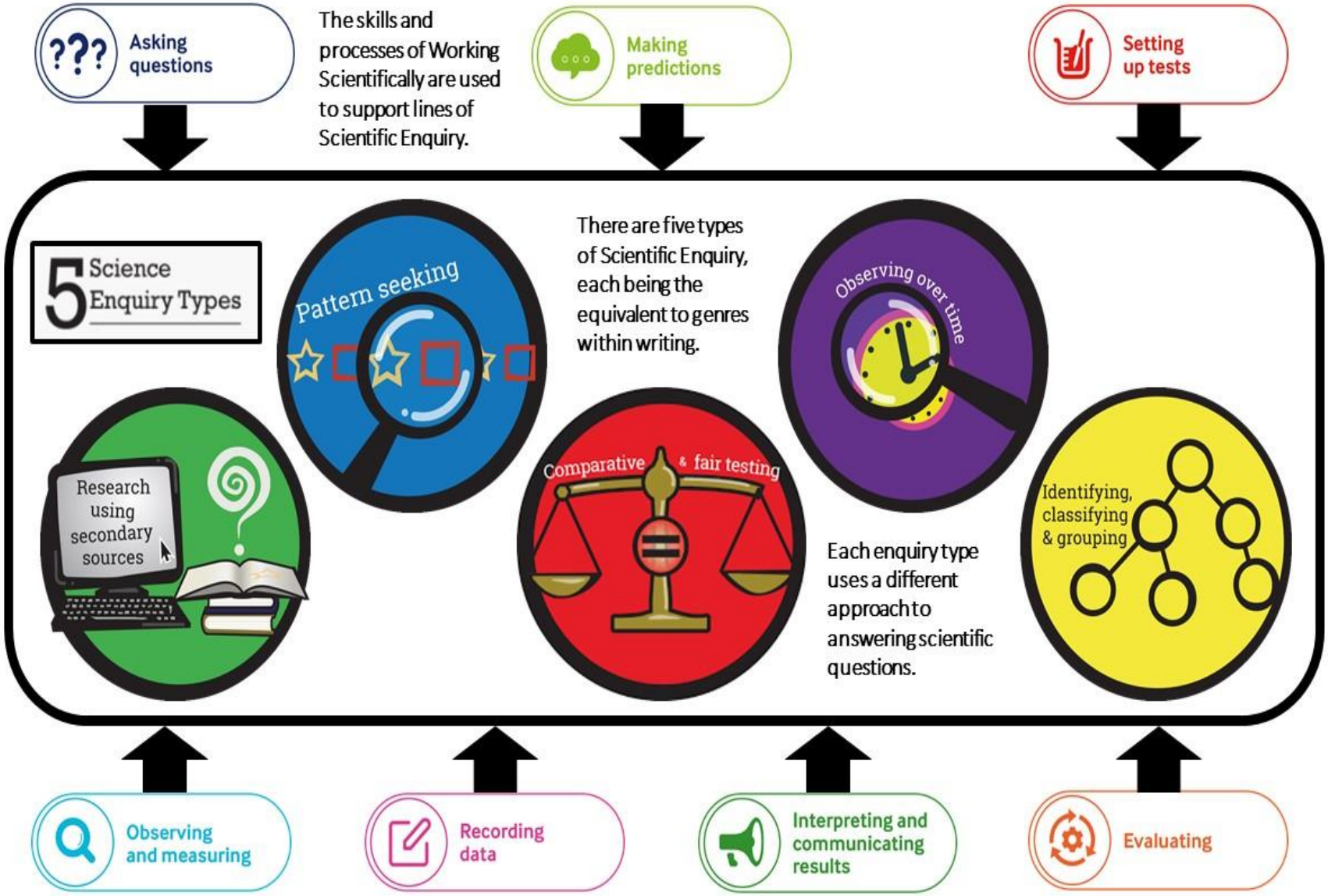
| End of EYFS (YR) | Key Stage 1 (Y1/2) | Lower Key Stage 2 (Y3/4) | Upper Key Stage 2 (Y5/6) |
|---|---|---|---|
| **Understanding the World**<br>**ELG: The natural World**<br><br>Explore the natural world around them, making observations and drawing pictures of animals and plants.<br><br>Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.<br><br>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. | The principal focus of science teaching in Key Stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly - constructed world around them.<br><br>They should be encouraged to be curious and ask questions about what they notice.<br><br>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><br>They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.<br><br>'Working scientifically' is described separately in the programme of study, but must **always** be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.<br><br>Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at Key Stage 1. | The principal focus of science teaching in Lower Key Stage 2 is to enable pupils to broaden their scientific view of the world around them.<br><br>They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions.<br><br>They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information.<br><br>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><br>'Working scientifically' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.<br><br>Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge. | The principal focus of science teaching in Upper Key Stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas.<br><br>They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically.<br><br>At Upper Key Stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates.<br><br>They should also begin to recognise that scientific ideas change and develop over time.<br><br>They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.<br><br>'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.<br><br>Pupils should read, spell and pronounce scientific vocabulary correctly. |

# Year 5 Working Scientifically Objectives Breakdown:

| | Plan | | Do | | Record | Review | | |
|---|---|---|---|---|---|---|---|---|
| Year 5 | Asking questions | Plan an enquiry | Making observations | Take measurements/using equipment | Gathering and presenting Evidence | Drawing conclusions | Explaining Evidence | Evaluating outcomes |
| | Children independently ask scientific questions. This may often be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. | Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question.<br><br>They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.<br><br>Select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample. | Make systematic and careful observations. | The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale.<br><br>During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value). | The children decide how to record and present evidence.<br><br>They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing.<br><br>Record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs.<br><br>They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys.<br><br>Children present the same data in different ways in order to help with answering the question. | Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources.<br><br>In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.<br><br>(Also as part of explaining evidence). | When answering their own questions, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer.<br><br>They talk about how their scientific ideas change due to new evidence that they have gathered.<br><br>They talk about how new discoveries change scientific understanding.<br><br>They communicate their findings to an audience using relevant scientific language and illustrations. | They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used.<br><br>They identify any limitations that reduce the trust they have in their data.<br><br>Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests. |

# Scientific Enquiry Types:

There are five types of scientific enquiry, which are used to support the scientific process. There should be a balance of enquiry types used within the Science Curriculum.



# Key Vocabulary (Based on PLAN Documentation):

| Year 5 | | | | |
|---|---|---|---|---|
| **Chemistry: Properties and Changes of Materials** | **Physics: Forces** | **Physics: Earth and Space** | **Biology: Living Things and Their Habitats (Life-Cycles)** | **Biology: Animals, Including Humans (Puberty and Human Life-Cycle)** |
| thermal conductor, thermal insulator, electrical conductor, electrical insulator, state of matter (solid, liquid, gas), object, material, property (hard / soft, transparent, translucent, opaque, permeable, impermeable, flexible, still, malleable, smooth, rough), mixture, dissolve, solution, filter, sieve, reversible change, irreversible change, burning, rusting, change of state, solubility | force, gravity, Earth, air resistance, water resistance, simple machines, friction, levers, pulleys, gears, parachute, mechanisms | phases, rotation, orbit, planets, seasons, star, hemisphere, moon, poles, space, reflect, solar system | life-cycle, reproduce, sexual reproduction, sperm, egg, fertilises, live young, metamorphosis, plantlets, runners, asexual reproduction, bulbs, cuttings, pollination | life-cycle, reproduce, sexual reproduction, sperm, egg, live young, puberty, adolescence, foetus, infant, child, adult |
| **Vocabulary from previous units of study (Linked)** | | | | |
| Year 4: Changing States of Matter<br><br>solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, condensation, temperature, water cycle, water vapour, precipitation, surface run-off | Year 3 Forces and Magnets<br><br>forces, push, pull, contact force, non-contact force, magnet (bar, button, ring, horseshoe), attract, repel, magnetic, magnetic strength, pole, iron, surface, friction | Year 1: Seasonal Changes<br><br>season, spring, summer, autumn, winter, day, night, weather<br><br>Additional: cold, sleet, hail, snow, weather forecast, weather symbols | Year 4: Living Things and Their Habitats<br><br>classification key, environment, habitat, human impact, species, life process, seasonal change, hibernate, migration<br><br>Vertebrate, Invertebrate, Warm-Blooded, Cold-Blooded, Flowering Plant, Non-Flowering Plant<br><br>Additional: leaf arrangement, leaf edge, simple leaves, compound leaves, leaf veins (only required if these features are used for identification purposes) | Year 4: Animals, Including Humans (Digestion)<br><br>digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, pancreas, nutrients, large intestine, rectum, anus, prey, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, food chain, organ, consumer |

| | | | | |
|---|---|---|---|---|
| **Year 3: Rocks and Fossils**<br><br>rock / stone, pebble, boulder, grain, crystals, layers, organic matter, permeable (absorbs water), impermeable (waterproof), soil, fossil, sedimentary rocks, metamorphic rocks, magma, igneous rocks | | | **Year 2: Living Things and Their Habitats**<br><br>living, non-living, dead, animal, habitat, food chain, prey, predator, carnivore, herbivore, omnivore, human, micro-habitat | **Year 3: Animals, Including Humans (Skeletons and Muscles)**<br><br>nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, skull, ribs, spine, joints |
| **Year 2: Uses of Everyday Materials**<br><br>material, properties, squashing, rigid, bending / flexible, twisting, brittle, stretching, hard, soft, rough, smooth, waterproof, absorbent, transparent, translucent, opaque, stiff | | | | **Year 2: Animals, Including Humans (Staying Healthy)**<br><br>healthy, diet, exercise, nutrients, hygiene, vegetables, fruit, carbohydrates, meat, dairy, grow, sleep, off-spring |
| **Year 1: Everyday Materials**<br><br>rough, property, smooth, material, object, hard, soft, stretchy, shiny, dull, waterproof, bendy, stiff, absorbent | | | | **Year 1: Animals, Including Humans (Senses)**<br><br>mammal, fish, reptile, bird, amphibian, herbivore, carnivore, omnivore, nocturnal, human, pet, senses |

# Mathematics within Science: Measuring, Recording and Representing Data

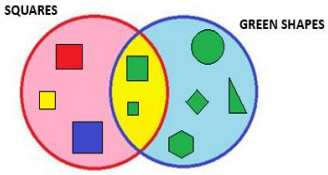
***'… Scientific process is infused with maths; maths changes the look of science in a way that one cannot separate it from the other. So if maths is the language of science, then is science the reason for maths?'*** (Primary Science 124 Sept/Oct 2012)

**Maths is an integral aspect of science as it is necessary in order to provide empirical evidence to support or refute scientific questions. Therefore, working scientifically and the scientific process requires children to be able to apply mathematical skills and concepts learned within the Primary Mathematics National Curriculum. Scientific investigation will require the use of measures (length, mass, volume, angles, time etc.) and subsequently, will require the representation of recorded data in the form of tables and charts/graphs. The type of graph required depends upon the type of data compiled: discrete or continuous numerical data. This in turn influences the choice of representation required (discrete: tally, bar, pie chart) or continuous (line, scatter graph). The selection of data representation should be in line with their age related expectations in Maths (Statistics).**

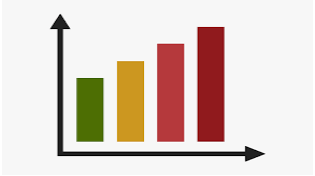
## Discrete Data Representation

| Favorite Pets | | |
|---|---|---|
| Pet | Tally Marks | Number |
|  | 𝍸 𝍸 | 10 |
|  | 𝍸 | 4 |
|  | 𝍸 I | 6 |

**Tally Chart / Frequency Table:** A method of recording the number of things seen using tally lines, with totals (frequencies) counted at the end of data collection.




**Venn Diagram:** A pictorial method for sorting and separating according to properties (usually non-numerical within

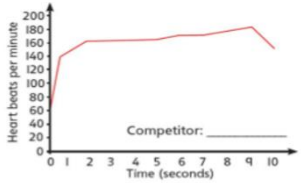


**Bar Chart / Graph:** Used to compare the numerical values of discrete data sets.

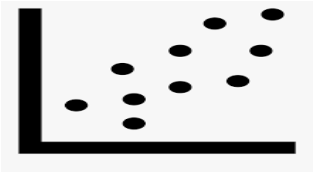
## Continuous Data Representation

| Water temperature (°C) | Time taken for sugar to dissolve (seconds) |
|---|---|
| 20 | 55 |
| 30 | 41 |
| 40 | 27 |

**Table:** Boxes (rows and columns) where numerical data can be studied.




**Line Graph:** Used to plot continuous data that changes over time or distance.



**X / Y Scatter Graph:** Use to find patterns and trends using two sets of numerical data in order to plot points.

# Reading within Science:

Reading is a vital delivery mechanism for the teaching and learning of Science. Consequently, it is fully integrated into the Science Curriculum, using key Reading skills / strands based upon 'Are You Really Reading?' (Identified on the unit overviews below). **Note:** the incorporation of reading within Science is to consolidate practicing those strands, whilst using them to deliver Science objectives. Therefore, the focus remains scientific.

All units of study have been allocated a key text (linked to the non-fiction reading spine – Science). These are as follow:

## Key Texts:

| Chemistry: Properties and Changes of Materials | Physics: Forces | Physics: Earth and Space | Biology: Living Things and Their Habitats (Life-Cycles) | Biology: Animals, Including Humans (Puberty and Human Life-Cycle) |
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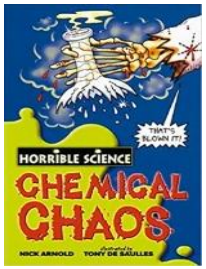
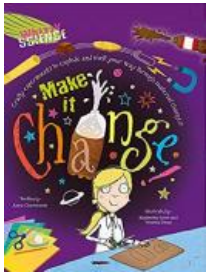
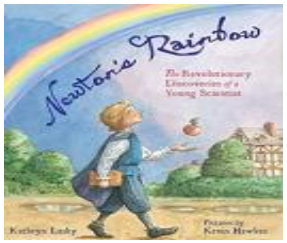
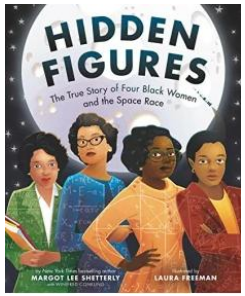
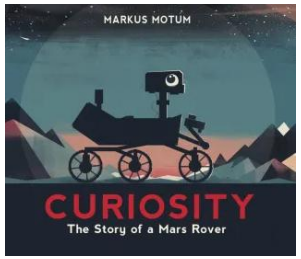
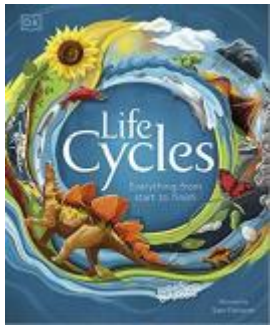
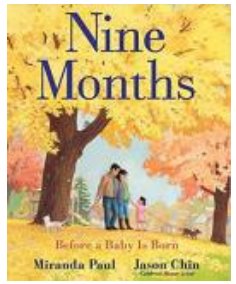
|  <br>  |  <br>  |  <br>  |  |  <br>  |

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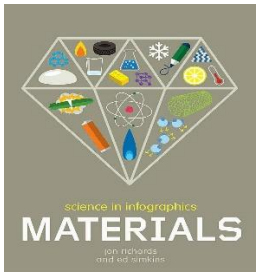
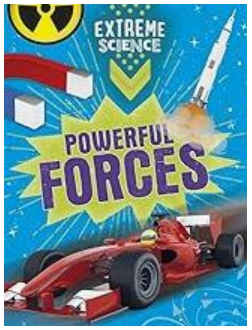
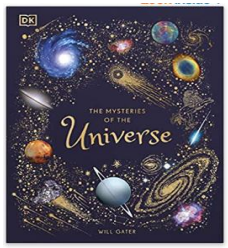
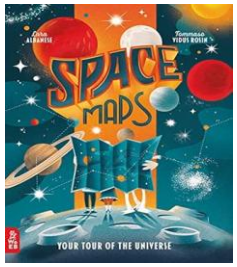
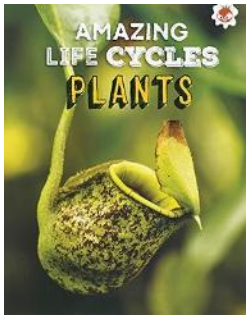
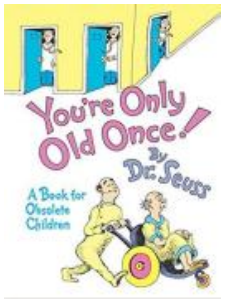
|  <br>**Horrible Science Chemical Chaos (Nick Arnold)**<br><br>**Whizzy Science Make It Change (Anna Claybourne)**<br><br>**Science in Infographics Materials (Jon Richards)** |  <br>**Gut-Wrenching Gravity and Other Fatal Forces (Disgusting and Dreadful Science)**<br><br>**Newton's Rainbow: The Revolutionary Discoveries of a Young Scientist (Kathryn Lasky)**<br><br>**Powerful Forces (Extreme Science) (Jon Richards)** |  <br>  <br>  <br>**Hidden Figures (Margot Shetterly)**<br><br>**Curiosity, The Story of a Mars Rover (Markus Motum)**<br><br>**The Mysteries of the Universe (DK Children's Anthologies)**<br><br>**The Planets: The Definitive Visual Guide to Our Solar System (DK and Maggie Aderin-Pocock)**<br><br>**Space Maps: Your Tour of the Universe: 1 (Lara Albanese)** |  <br>**Life Cycles: Everything from Start to Finish (DK Life Cycles)**<br><br>**Plants – Amazing Life Cycles (John Allan)** |  <br>**Nine Months: Before a Baby is Born (Miranda Paul)**<br><br>**Hair in Funny Places (Babette Cole)**<br><br>**You're Only Old Once! (Dr Seuss)** |

# Science Capital – Key Scientist Studies:

Science capital is vital in broadening the children's wider understanding of Science and the role it plays within their wider lives. This includes understanding the contributions famous scientists have made in furthering knowledge and understanding in their respective disciplines. Whilst historically, there is a gender imbalance, where possible, the range of scientists linked to specific units of study better reflect modern attitudes towards Science and STEM. Linked scientist biographical studies are identified within the unit overviews below.

The **Upper KS2 Science Parents' Guide** contains additional information regarding what Science Capital is, why it is important for science education and provides lists of possible places to visit to enhance interest and understanding within the subject.

| Unit of Study: | Chemistry: Properties and Changes of Materials | Physics: Forces | Physics: Earth and Space | Biology: Living Things and Their Habitats (Life-Cycles) | Biology: Animals, Including Humans (Puberty and Human Life-Cycle) |
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| **Linked Scientists:** | **Other:**<br><br>**Spencer Silver (1941-2021)** (Chemical engineer and chemist who invented the Post-It Note) | **Biographical Study:**<br><br>**Isaac Newton (1643-1727)** (English physicist and mathematician, who devised the Laws of Motion, the theory of Gravity and optics) **(Covered in Y6 – focus on Forces and Gravity)** | **Biographical Study:**<br><br>**Katherine Johnson (1918-2020)** (African-American mathematician, whose calculations helped NASA's Apollo programme reach the Moon)<br><br>**Other:**<br><br>**Nicolaus Copernicus (1473-1543)** (Polish physicist and astronomer, who proved the Heliocentric Model of the Solar System) | **Other:**<br><br>**Jane Goodall (1934-Present)** (English primatologist and conservationist who studied chimpanzees) | |

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| | | | **Galileo Galilei (1564-1642)** (Italian physicist and astronomer, who supported the Heliocentric Model of the Solar System, developed optical telescopes and discovered Jupiter's Galilean Moons and Saturn's rings.) | | |

# SCIENCE CURRICULUM GUIDANCE: YEAR 5

***'Learn, Sparkle & Shine.'***

| **Year Group:** 5<br>**Term:** Autumn 1-2 | **Unit of Study:**<br>Properties and Changes of Materials | **Science Branch:**<br>Chemistry |
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| **Composite (The Big Idea):**<br><br>Different materials have properties, which make them suitable or unsuitable for making things (objects). Some mixtures of materials react with one another, creating new materials (irreversible changes), whilst others can be separated again back into their original materials (reversible changes). | **Context:**<br><br>This chemistry unit continues the children's understanding of materials developed in KS1 with Everyday Materials (Year 1) and Uses of Everyday Materials (Y2), where children learn that objects are constructed from materials which are suitable to their intended purpose. In Year 3, pupils looked at different types of rocks and how these are formed and how people use them for construction purposes. Year 4 introduces States of Matter, which is an essential precursor to this unit due to irreversible chemical reactions (Example: creation of carbon dioxide from mixing vinegar and bicarbonate of soda).<br><br>In this year 5 unit, pupils further develop their knowledge as they compare and group together everyday materials on the basis of their properties, including hardness (using Moh's Hardness Scale), magnetism (building upon Year 3), solubility, transparency and electrical and thermal conductivity (Year 4) knowledge). New learning includes knowing that some materials will dissolve in liquid to form a solution, and knowing how to recover a substance from a solution using evaporation. Pupils know that some materials change state when they are heated or cooled (e.g. evaporation and condensation in the water cycle – Year 4) and associate the rate of evaporation with temperature. Pupils use their knowledge of solids, liquids and gases to decide how mixtures might be separated, including through magnetism, filtering, sieving and evaporating. The knowledge acquired during this unit will help pupils understand that dissolving, mixing and changes of state are reversible changes. By the end of the unit, pupils will be able to explain that some changes result in the formation of new materials, and that this kind of change is irreversible. This unit is the precursor to work studied in KS3 as pupils continue to learn about states of matter. | |

| **Prior Learning Requirements:** | **Common Misconceptions (PLAN):** |
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| • That matter is made of atoms and can exist in solid, liquid or gas state<br>• Magnetic materials include iron, nickel and cobalt.<br>• Sieves can be used to separate small and large particles.<br>• Water evaporates at higher temperatures.<br>• Objects are made out of materials chosen for the suitability of their properties. | Some children may think:<br><br>• Thermal insulators keep cold in or out<br>• Thermal insulators warm things up<br>• Solids dissolved in liquids have vanished and so you cannot get them back<br>• lit candles only melt, which is a reversible change. |
| **Biographical Study - Scientist:**<br><br>**Possible Mention: Spencer Silver (1941-2021)** (Chemical engineer and chemist who invented the Post-It Note) | **Key Vocabulary (Linked to PLAN) (Full list on Vocabulary progression document):**<br><br>• **Thermal Conductor:** A material through which heat can easily travel.<br>• **Thermal Insulator:** A material preventing heat travel.<br>• **Electrical Conductor:** A material allowing the flow of electricity through it.<br>• **Electrical Insulator:** A material blocking the flow of electricity.<br>• **State of Matter:** Whether a material is a **solid** (fixed shape), a **liquid** (fixed volume; takes the shape of its container) or a **gas** (changeable volume and shape) caused by particle arrangements.<br>• **Object:** Anything created for a purpose using different materials. Example: a stapler, a table.<br>• **Material:** The matter from which other things are made. Examples: metal, plastic, glass.<br>• **Property:** The way in which a material behaves. Examples: **hard**, **soft**, **transparent**, **translucent**, **opaque**, **permeable**, **impermeable**, **flexible**, **stiff**, **malleable**, **smooth**, **rough**)<br>• **Mixture:** Two or more materials put together.<br>• **Dissolve:** A solid's particles become mixed within a liquid (usually water), forming a solution. It looks as if the solid has disappeared – it has not. The particles are simply too small to be seen.<br>• **Solution:** Liquids (solvents) containing dissolved solids (solute).<br>• **Filter:** The removal of solids from liquids using microscopic holes, allowing only the water to pass through.<br>• **Sieve:** Using holes to separate solids of different sizes.<br>• **Reversible Change:** A mixture of materials that can be undone. New materials are created.<br>• **Irreversible Change:** A mixture of materials, which undergo a chemical reaction or change, creating new substances. You cannot get your original materials back. Examples: **rusting**, **burning**.<br>• **Solubility:** Is a chemical property referring to the ability for a given substance, the solute, to dissolve in a solvent.<br>• **Changing State:** Temperature causing solids to melt into liquids, liquids to freeze into solids, liquids to evaporate into gases and gases to condense into liquids. |

**NC Objectives (Substantive Knowledge):**

- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

**Working Scientifically (Disciplinary Knowledge):**

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graph.
- Using test results to make predictions to set up further comparative and fair tests.
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.
- Identifying scientific evidence that has been used to support or refute ideas or arguments.

**Key enquiry types:**

- Fair and Comparative Testing – dissolving linked to water temperature; Moh's hardness test
- Pattern-Seeking – magnetic / non-magnetic materials; which solids dissolve? Is it possible to separate materials?
- Classifying and Sorting – grouping materials according to their properties.
- Observing Over Time – what happens when materials are mixed?

**Maths Links:**

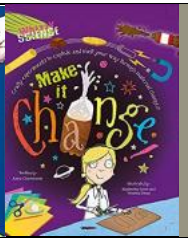
- Measuring mass / volumes when mixing materials; differences in mass when reactions have occurred.
- Graphing (bar chart) and data tables – mass of sugar dissolved (grams or cubes).
- Scale reading – thermometers and temperature of water.

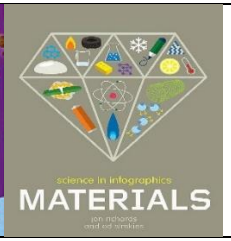
**ATRR Reading Links:**

- Strand 2: Six-Word Summary (explain different processes – example: dissolving; irreversible changes etc.).
- Strand 4: Impression and Evidence (Changes in materials).

**Linked Texts:**

- Horrible Science Chemical Chaos (Nick Arnold)
- Whizzy Science Make It Change (Anna Claybourne)
- Science in Infographics Materials (Jon Richards)






**(Components) Lesson Sequence:**

LC1: Why has that material been chosen? (re-cap of material properties and application)
LC2 Which material is the hardest?
LC3: Which materials are soluble in water?
LC4: (Investigation) How does water temperature affect solubility? (Change temperature of water and dissolve sugar)
LC5: Which materials are thermal conductors and thermal insulators? (Materials keeping things hot or cold)
LC6: Which materials are electrical conductors?
LC7: How can I separate these materials? (Include salt and magnetic materials. Techniques: picking, sieving and magnetism).
LC8: Where did the salt go and can I get it back? (Include filtration of sand, mixed with salt water).
LC9: What is an irreversible change? (Vinegar + bicarbonate of soda; milk + vinegar = casein).

**Prior Learning (Can you still?):**

**Write questions from within this unit once taught. For example:**

- What is a reversible change? Give an example.
- What is an irreversible change? Give an example.
- What separation process is best for removing paper clips from sand?
- What is dissolving?
- Which of the following are soluble? (Coffee, sand, salt, soil, sugar)
- Use a Venn diagram to sort materials according to their properties (select appropriate properties as required).
- Use a Carroll diagram to sort objects according to properties (Example: Hard/not hard, opaque/not opaque etc.)
- What is a thermal conductor? Give an example.
- What is a thermal insulator? Give an example.
- Which materials are electrical conductors?
- What happens to solubility as water temperature increases?
- Display an object – pupils to identify materials and the desired properties required.

**Previous Years (example questions linked to chemistry units):**

- Name the three states of matter. Give examples of each.
- Label processes (freezing/melting, evaporation/condensation)
- Practice reading temperature scales (thermometers)
- What is the water cycle?
- Six-word summaries of each section of the water cycle.

- Name the three main types of rocks?
- How are sedimentary rocks formed? Give an example.
- How are igneous rocks formed? Give an example.
- How are metamorphic rocks formed? Give an example.
- What is soil?
- How is soil made?
- What is a fossil?
- How are fossils formed?

- Sorting activity: objects, materials, properties identification.
- Why is glass used for windows?
- What is an opaque object?
- What is a transparent object?
- What is a translucent object?
- Give three properties of … ? (Provide a material)

**Note:** Selections from other, non-chemistry units of study can and should also be included.

<table>
<tr><td>Year Group: 5<br>Term: Spring 1</td><td>Unit of Study:<br>Forces</td><td>Science Branch:<br>Physics</td></tr>
<tr><td colspan="2">Composite (The Big Idea):<br><br>Forces can move objects, change their direction of travel and their shape. Forces are pushes and pulls and can be contact forces such as friction or non-contact forces such as gravity. Friction, air and water resistance can slow the movement of objects. Simple machines such as gears, levers and pulleys can transform the direction and strength of forces, which are measured in Newtons (N).</td><td>Context:<br><br>In Year 3, children will have developed their understanding of what forces are, exploring pushes, pulls as well as friction, which causes objects to slow down, and generates heat. They will understand how different surfaces affect how objects move and will know that most forces require physical contact, but some forces such as magnetism do not (magnetic poles attracting and repelling one another). New learning in this unit includes knowing that unsupported objects fall towards the Earth because of the force of gravity acting between the centres of mass of the Earth and the falling object. Pupils study the effects of air resistance, water resistance and friction that act between moving surfaces. By the end of the unit, pupils will also have an understanding of simple machines. They will know how these mechanisms, including levers, pulleys and gears work, allowing a smaller force to have a greater effect.</td></tr>
<tr><td colspan="2">Prior Learning Requirements:<br><br>• Forces are pushes and pulls<br>• These forces change the motion of an object. They will make it start to move or speed up, slow it down or even make it stop.<br>• Friction is a force that holds back the motion of an object<br>• Some surfaces create more friction than others which means that objects move across them slower<br>• On a ramp, the force that causes the object to move downwards is gravity</td><td>Common Misconceptions (PLAN):<br><br>Some children may think:<br><br>• The heavier the object the faster it falls, because it has more gravity acting on it<br>• Forces always act in pairs which are equal and opposite<br>• Smooth surfaces have no friction<br>• Objects always travel better on smooth surfaces<br>• A moving object has a force which is pushing it forwards and it stops when the pushing force wears out<br>• A non-moving object has no forces acting on it<br>• Heavy objects sink and light objects float.</td></tr>
<tr><td colspan="2">Biographical Study - Scientist:</td><td>Key Vocabulary (Linked to PLAN) (Full list on Vocabulary progression document):<br><br>• Force: The strength of a physical action or movement measured in Newtons (N).</td></tr>
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| **Isaac Newton (1643-1727)** (English physicist and mathematician, who devised the Laws of Motion, the theory of Gravity and optics) **(Covered in Y6 – focus on Forces and Gravity)** | • **Gravity:** Gravity is a force which tries to pull two objects toward each other.<br>• **Earth:** The third planet from the Sun. Our home planet.<br>• **Air Resistance:** Air resistance is a type of friction between air and another material. For example, when an aeroplane flies through the air or a **parachute** falls to Earth.<br>• **Water Resistance:** If you go swimming, there is friction between your skin and the water particles, making it harder to move.<br>• **Simple Machines:** Devices that change the direction or magnitude of forces. These include **gears**, **levers** and **pulleys**. When combined, they form **mechanisms**.<br>• **Friction:** Friction is a force between two surfaces that are sliding, or trying to slide, across each other.<br>• **Levers:** A lever can be described as a long rigid body with a fulcrum along its length.<br>• **Pulleys:** Pulley is a simple machine and comprises of a wheel on a fixed axle, with a groove along the edges to guide a rope or cable. They are used to lift heavy objects more easily.<br>• **Gears:** Gears are wheels with teeth that slot together. When one gear is turned the other one turns as well, but in the opposite direction. Smaller gears turn more quickly than larger gears. |

**NC Objectives (Substantive Knowledge):**

- 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.

**Working Scientifically (Disciplinary Knowledge):**

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graph.
- Using test results to make predictions to set up further comparative and fair tests.
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.
- Identifying scientific evidence that has been used to support or refute ideas or arguments.

**Key enquiry types:**

- **Fair and Comparative Test:** Parachute area against fall time.
- **Pattern Seeking:** Parachute area against fall time (air-resistance). Objects moving across surfaces (friction).
- **Observations Over Time:** Effects of simple machines on force required.

**Maths Links:**

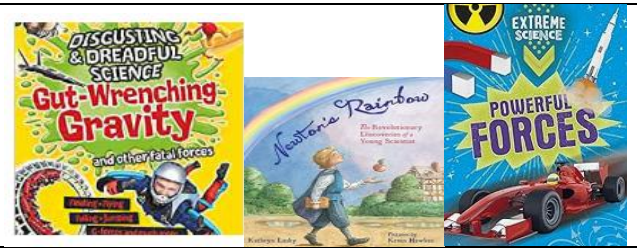
- Time measurements (parachute fall times), including calculation of differences.
- Area calculation (rectangular parachutes).
- Graphing (Scatter) – plotting drop time against parachute area; bar charts (water resistance sink time).
- Scale reading – Newton meters (changes in lift force required due to pulley systems).
- Tables to record data.
- Mass – Force conversion (kilograms to Newtons)

**ATRR Reading Links:**

Strand 1: Timeline – key events on Newton's life.
Strand 2: Six-Word Summary (Summarising key scientific terms and concepts, including simple machines).
Strand 4: Impression and Evidence (Events linked to Newton's discoveries).
Strand 5: Most Important Things (Identification of factors and variables linked to investigations).

**Linked Texts:**

- Gut-Wrenching Gravity and Other Fatal Forces (Disgusting and Dreadful Science)
- Newton's Rainbow: The Revolutionary Discoveries of a Young Scientist (Kathryn Lasky)
- Powerful Forces (Extreme Science) (Jon Richards)




**(Components) Lesson Sequence:**

- LC1: Why do we not fall off the Earth? (Concept of gravity; Mass – Force conversion and link to Galileo's Pisa experiment – two balls of same volume but different mass).
- LC2: Is friction useful? (Explore different surfaces)
- LC3: (Investigation) How does air resistance work? (Investigation question: How does the area of a parachute affect its fall time? Use rectangular parachutes to enable area calculation – scatter graph against fall time in seconds to observe pattern).
- LC4: How can a shape move quickly through water? (Models of the same mass; different shapes falling through liquids – note: a more viscous liquid would allow for longer sink times and more accurate measurements from which bar charts can be drawn).
- LC5: (Biography) Who was Sir Isaac Newton?
- LC6: What are simple machines? (Explore gears and levers)
- LC7: How can a pulley system help you to move heavy objects?

**Prior Learning (Can you still?):**

**Write questions from within this unit once taught. For example:**

- What is air resistance?
- What is water resistance?
- What is friction? Why is it useful?
- Explain how gravity works.
- Name examples of simple machines?
- What is a pulley system?
- How do gears work?

**Previous Years (example questions linked to physics units):**

- Which surface will create the most friction?
- Will the magnets attract or repel? (Show different combinations of poles)
- Sorting activity - magnetic / non-magnetic objects.
- Identify pushes and pulls on images.
- What is a shadow?
- Identify objects as opaque, translucent and transparent.
- Light travels in _____ _____ . (Straight lines).
- Give an example of a primary light source.
- Give an example of a secondary light source.
- What causes sound waves to form? (Vibration)
- How does sound travel?
- What happens to sound over distances?
- What it pitch?
- What is volume?
- What is frequency?
- Sort objects – mains / battery powered
- Name electrical conductors.
- Name circuit components.
- What is electricity?
- Provide examples of naturally occurring electricity.
- What are the four seasons (in order)?
- Six-word summaries for each season (Example: Winter: Cold, dark, lifeless, wet, stormy)

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<tr><td>Year Group: 5<br>Term: Spring 2</td><td>Unit of Study:<br>Earth and Space</td><td>Science Branch:<br>Physics</td></tr>
<tr><td>Composite (The Big Idea):<br><br>The Earth is a rocky planet in space, which forms part of the Solar System. Being one of eight planets that orbit the Sun (a star), it has a Moon, whose appearance from Earth changes on a 28 day cycle. Human knowledge of the Solar System has developed through the discoveries of famous astronomers, including Copernicus and Galileo Galilei.</td><td colspan="2">Context:<br><br>This unit builds upon the children's understanding of forces from Years 3 and 5, in particular gravity (Y5) and its importance to the formation and orbits of objects within the Solar System. Children should also have an understanding of weather systems and seasons from Year 1, beginning to link this to this unit's learning to help them to understand why this occurs. In this Year 5 unit, pupils describe the Sun, Earth and Moon as approximately spherical bodies. They learn about the movement of the Earth and other planets, relative to the Sun within the solar system. Pupils also learn about the movement of the Moon relative to the Earth (linking the Lunar cycle to months). By the end of the unit, pupils use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. This unit is the precursor to work studied in KS3 when pupils continue to study forces as part of the discipline of physics.</td></tr>
<tr><td>Prior Learning Requirements:<br><br>• We have four seasons (autumn, winter, spring and summer).<br>• Know that a shadow is caused when an object blocks light from passing through it.<br>• Know that a shadow is caused when an object blocks light from passing through it.<br>• The properties of a sphere<br>• That the moon is not a source of light</td><td colspan="2">Common Misconceptions (PLAN):<br><br>Some children may think:<br><br>• The Earth is flat<br>• The Sun is a planet<br>• The Sun rotates around the Earth<br>• The Sun moves across the sky during the day<br>• The Sun rises in the morning and sets in the evening<br>• The Moon appears only at night<br>• Night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.</td></tr>
<tr><td>Biographical Study - Scientist:<br><br>Katherine Johnson (1918-2020) (African-American mathematician, whose calculations helped NASA's Apollo programme reach the Moon)</td><td colspan="2">Key Vocabulary (Linked to PLAN) (Full list on Vocabulary progression document):<br><br>• Phases: The changing appearance of the Moon when viewed from Earth due to its position in relation to the Earth and Sun.<br>• Rotation: The act of turning on or around an axis.</td></tr>
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| **Possible Mentions:**<br><br>**Nicolaus Copernicus (1473-1543)** (Polish physicist and astronomer, who proved the Heliocentric Model of the Solar System)<br><br>**Galileo Galilei (1564-1642)** (Italian physicist and astronomer, who supported the Heliocentric Model of the Solar System, developed optical telescopes and discovered Jupiter's Galilean Moons and Saturn's rings.) | • **Orbit:** An orbit is a repeating elliptical path that one celestial body takes around another.<br>• **Planets:** There are eight planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.<br>• **Seasons:** One of the four parts of the year; spring, summer, fall, and winter.<br>• **Star:** A giant ball of super-heated gases (hydrogen and helium), around which planets orbit. Our Sun is a star.<br>• **Hemisphere:** Either of two halves of the earth.<br>• **Moon:** The earth's natural satellite.<br>• **Poles:** Either end of a planet's, moon's, or star's axis.<br>• **Space:** A vast vacuum which contains the entire material universe and its events.<br>• **Reflect:** to throw back from a surface.<br>• **Solar System:** The solar system is made of the eight planets that orbit our sun. It is also made of asteroids, moons, comets and dwarf planets. |
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| **NC Objectives (Substantive Knowledge):** | **Working Scientifically (Disciplinary Knowledge):** |
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| • Describe the movement of the Earth and other planets relative to the sun in the solar system.<br><br>• Describe the movement of the moon relative to the Earth.<br><br>• Describe the sun, Earth and moon as approximately spherical bodies<br><br>• Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. | • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.<br><br>• Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.<br><br>• Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graph.<br><br>• Using test results to make predictions to set up further comparative and fair tests.<br><br>• Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.<br>• Identifying scientific evidence that has been used to support or refute ideas or arguments. |

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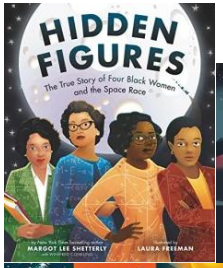
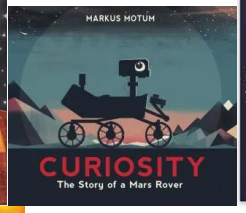
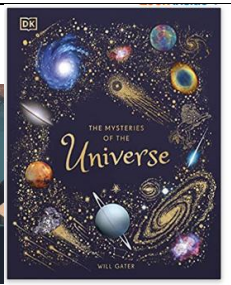
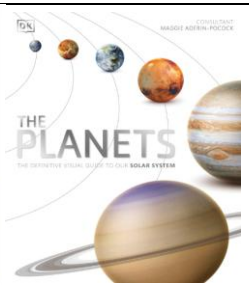
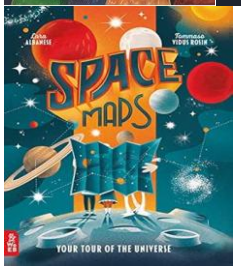
| | **Key enquiry types:**<br><br>• Research Using Secondary Resources (Information linked to planets and wider Solar System).<br>• Pattern Seeking (Day/Night length throughout the year).<br>• Classification and Sorting: types of planets – rocky, gas giants and ice giants. |
| **Maths Links:**<br>• Time conversion between months and years (orbit times; day length).<br>• Distances (place value).<br>• Tabulation of data for comparisons.<br>• Bar charts – changing day/night length within 24-hour periods throughout the year). | |
| **ATRR Reading Links:**<br>Strand 1: Timeline – Galileo's / Katherine Johnson's lives and discoveries; discovery of plants by year.<br>Strand 2: Six-Word Summary (Key concepts about space and events in Galileo and Katherine Johnson's lives).<br>Strand 4: Impression and Evidence – linked to scientist biographies and discoveries.<br>Strand 5: The 3/5 Most Important Things (Key concepts and discoveries). | |
| **Linked Texts:**<br><br>• Hidden Figures (Margot Shetterly)<br>• Curiosity, The Story of a Mars Rover (Markus Motum)<br>• The Mysteries of the Universe (DK Children's Anthologies)<br>• The Planets: The Definitive Visual Guide to Our Solar System (DK and Maggie Aderin-Pocock)<br>• Space Maps: Your Tour of the Universe: 1 (Lara Albanese) |  <br>  <br>  <br>  <br>  |

**(Components) Lesson Sequence:**

- LC1: What do we know about the Earth? If is flat?
- LC2: What is the heliocentric theory? (Link to planets of the Solar System orbiting the Sun – discuss Copernicus and Galileo's contributions) (Consider reading comprehensions about both scientists outside of science lessons).
- LC3: What are the other planets like compared to the Earth? (Research - NCR on a planet of their choice).
- LC4: How long is a year on each planet? (Use string modelling on yard; research and tabulate. Calculate age on each planet: Your Age on Other Worlds | Exploratorium)
- LC5: How does the Moon move and why does it change shape?
- LC6: How do we get day and night? (Bar graph day/night on 24-hour axis each month – Pattern Seeking).
- LC7: Who was Katherine Johnson? (WALT: Newspaper Report)

**Prior Learning (Can you still?):**

**Write questions from within this unit once taught. For example:**

- Name the planets of the Solar System (in order).
- What is the Sun?
- What is the heliocentric model?
- Sorting task: rocky planets, gas giants, ice giants
- Which is the only planet known to support life?
- What is an orbit?
- Name the phases of the Moon.

**Previous Unit:**

- What is air resistance?
- What is water resistance?
- What is friction? Why is it useful?
- Explain how gravity works.
- Name examples of simple machines?
- What is a pulley system?
- How do gears work?

**Previous Years (example questions linked to physics units):**

- Which surface will create the most friction?
- Will the magnets attract or repel? (Show different combinations of poles)
- Sorting activity - magnetic / non-magnetic objects.
- Identify pushes and pulls on images.

- What is a shadow?
- Identify objects as opaque, translucent and transparent.
- Light travels in _____ _____ . (Straight lines).
- Give an example of a primary light source.
- Give an example of a secondary light source.
- What causes sound waves to form? (Vibration)
- How does sound travel?
- What happens to sound over distances?
- What it pitch?
- What is volume?
- What is frequency?
- Sort objects – mains / battery powered
- Name electrical conductors.
- Name circuit components.
- What is electricity?
- Provide examples of naturally occurring electricity.
- What are the four seasons (in order)?

Six-word summaries for each season (Example: Winter: Cold, dark, lifeless, wet, stormy)

<table>
<tr><td>Year Group: 5<br>Term: Summer 1</td><td colspan="2">Unit of Study:<br>Living Things and Their Habitats (Life-Cycles)</td><td>Science Branch:<br>Biology</td></tr>
<tr><td>Composite (The Big Idea):<br><br>All living things have life-cycles, where they are born, live and ultimately die. In order for different species to pass on their genetic code (DNA), they must reproduce, with males and females forming offspring. Some plants can reproduce on their own. Different organisms have different life-cycles, including those who undergo partial or complete metamorphosis – a change in body morphology (looks).</td><td colspan="3">Context:<br><br>Pupils have a secure knowledge of the functions of the different parts of flowering plants (Years 1-3) and the requirements of plants for life and growth (Year 3). They know how water is transported within plants and the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal (Year 3). Pupils can identify and name a variety of living things in their local and wider environment (Years 1, 2 and 4) and use classification keys to help group and identify plants and animals (Year 4).<br><br>In Year 5, pupils will use their knowledge of food chains, habitats and environments to look at how some living things adapt to their surroundings (pre-cursor to classification in Year 6). New learning includes knowing and describing the features of different animal types and the similarities and differences in their life cycles (mammals, amphibians, insects and birds). They also explore plant reproduction, including both sexual and asexual reproduction. Pupils also further develop their knowledge of the seven life processes (MRS GREN). The knowledge acquired in this unit will help pupils understand the life process of reproduction in some plants and animals. This is the precursor to work studied in Year 6 when pupils study Linnaean classification, adaptations and sexual reproduction in plants and animals.<br><br>Note: This unit links heavily with Y5 Animals, Including Humans (Puberty and Human Life Cycle). Consequently, these two units will be merged, covering all objectives and learning components.</td></tr>
<tr><td>Prior Learning Requirements:<br><br>• Animals can be grouped into vertebrates (and then further into fish, reptiles, amphibians, birds and mammals) and invertebrates<br>• Some examples of life cycles (including those of plants)<br>• The processes of dispersal, fertilisation and germination</td><td colspan="3">Common Misconceptions (PLAN):<br><br>Some children may think:<br><br>• All plants start out as seeds<br>• All plants have flowers<br>• Plants that grow from bulbs do not have seeds<br>• Only birds lay eggs.</td></tr>
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| | |
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| • Reproduction is one of the seven life processes.<br>• Parts of a plant, their features and what their functions are. | |
| **Biographical Study - Scientist:**<br><br>**Possible Mention: Jane Goodall (1934-Present)** (English primatologist and conservationist who studied chimpanzees) | **Key Vocabulary (Linked to PLAN) (Full list on Vocabulary progression document):**<br><br>• **Life Cycle:** The series of changes in the life of an organism including reproduction<br>• **Reproduce:** To have off-spring.<br>• **Sexual Reproduction:** Offspring get genes from both mum and dad, inheriting a mix of features from both.<br>• **Sperm/Egg:** The male and female cells used in reproduction. They carry DNA.<br>• **Fertilises:** The fusion (joining) of pollen or sperm (make reproduction cells) to the egg (female reproduction cells) to create a new cell with DNA from both parents. This grows into the new organism.<br>• **Live Young:** Born without the need for eggs (most mammals).<br>• **Metamorphosis:** The process of complete change in body type and shape during a life-cycle.<br>• **Plantlets:** New plants growing asexually from the end of runners.<br>• **Runners:** Horizontal stems, which grow across the ground. Part of asexual reproduction. Plantlets grow from these.<br>• **Asexual Reproduction:** Offspring get genes from one parent so are clones of their parents<br>• **Bulbs:** An underground storage structure, from which new shoots and roots grow, forming new plants.<br>• **Cuttings:** Stems of plants cut and regrown into full plants. Cuttings can be combined to create new plants.<br>• **Pollination:** The process of pollen (male) making contact with the style (female part) of a flower. A pollen tube is grown, down which the pollen grain travels to fertilise the egg in the ovule. |

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| **NC Objectives (Substantive Knowledge):**<br><br>• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.<br><br>• Describe the life process of reproduction in some plants and animals. | **Working Scientifically (Disciplinary Knowledge):**<br><br>• Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.<br>• Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.<br>• Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graph.<br>• Using test results to make predictions to set up further comparative and fair tests. |

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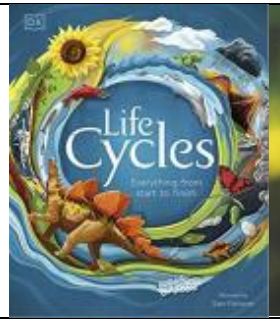
| • Recap classification of animals from year 1 with the addition of: w*hales, dolphins (sea mammals) and kangaroos (marsupial) echidna and duckbill platypus (as egg laying mammals.)*.<br><br>• Reproduction and life-cycles of animals such as: *salamander, kangaroo, butterfly, penguin*<br><br>• Reproduction in plants including trees such as *sycamore and cherry tree, elderflower, carnation and hyacinth potato, ginger, allium: garlic and strawberry plants.* | • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.<br>• Identifying scientific evidence that has been used to support or refute ideas or arguments.<br><br>**Key enquiry types:**<br>• Research Using Secondary Sources of Information (Life cycles and features of plants and animal types).<br>• Classification and Sorting – similar life cycle features.<br>• Observing Over Time – Growth of runners from potatoes or other plants. Growth of seeds. |

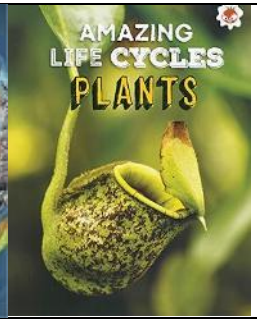
**Maths Links:**
- Times (Days, Months, Years) – how long do organisms live? How long do runners take to grow? How long do seeds take to germinate?
- Heights / distance – length of runners / heights of germinated stems.
- Graphing – line graphs of runner lengths / stem heights.

**ATRR Reading Links:**
Strand 1: Timeline – links to lifecycle stages.
Strand 2: Six-Word Summary (Summarise key features of living things)

**Linked Texts:**

- Life Cycles: Everything from Start to Finish (DK Life Cycles)
- Plants – Amazing Life Cycles (John Allan)






**(Components) Lesson Sequence:**

LC1: How important are the parts of a flowering plant?
LC2: How do plants reproduce?
LC3: What is the life cycle of a plant? (Observations with line graphing potential: plant various seeds and observe germination – take measurements)

LC4: How do non-flowering plants reproduce? (Observations with line graphing potential – runner length from potatoes)
LC5: Do mammals have the same life cycle?
LC6: What are eggs? (Primarily linked to birds and reptile life cycles)
LC7: What is metamorphosis and why is it important to amphibians?
LC8: What are the stages of an insect's life cycle?

**Prior Learning (Can you still?):**

**Write questions from within this unit once taught. For example:**

- What is an egg?
- Which type of mammals lay eggs?
- What process do insects such as butterflies go through when they form a chrysalis?
- Features of different animals – display image: what make a bird a bird? (Substitute for other animal types).
- What is asexual reproduction? Give an example of a plant that does this.
- Recap previously taught life cycles.

**Previous Units:**
See above units prior learning questions.

**Previous Years (example questions linked to Biology units):**

- What is a herbivore? Give an example.
- What is an omnivore? Give an example.
- What is a carnivore? Give an example.
- Provide images of living things – create food chains and food webs.
- Show images of habitats – identify features.
- Sorting task: domesticated / wild animals.
- Naming tasks – animals and plants.
- Identification tasks – name animal and identify the type of animal (Example: Lion – Mammal)
- Provide animals or plants – create 'Yes/no' identification key.
- Name parts of plants (labelling task)
- Name parts of a flower (labelling task)
- What types of seed dispersal are there?
- What is pollination?
- What is germination? What are the different stages of it?

<table>
<tr><td>Year Group: 5<br>Term: Summer 2</td><td>Unit of Study:<br>Animals, Including Humans (Puberty and Human Life-Cycle)</td><td>Science Branch:<br>Biology</td></tr>
<tr><td>Composite (The Big Idea):<br><br>As mammals, humans are born live. As babies, humans are completely reliant upon their parents' care, feeding on milk whilst they develop and grow. Eventually, the child will learn to walk, developing into a child where significant brain development occurs. Children undergo a process called puberty, which transitions their change into adults capable of reproduction. As humans age, they become less agile and strong.</td><td colspan="2">Context:<br><br>This unit continues to build upon the children's understanding of animals and humans, during which they have learnt about senses (Year 1), staying healthy (Year 2), balanced diets, muscles and skeletons (Year 3), and digestion and teeth (Year 4). This Year 5 unit focusses on the changes and key developments that occur as humans mature from birth to old age. Pupils learn what older people need to stay healthy and the difficulties they may face, including memory loss and a weakened immune system and bones. They also learn about puberty and the major changes, which occur to both boys and girls during this time (links to SRE lessons in Years 5 and 6). Pupils also explore pregnancy within different placental mammals, looking at gestation periods and overall life expectancies. This unit is the precursor to work in Year 6 as pupils learn about the circulatory system and dental structures.<br><br>Note: This unit links heavily with Y5 Living Things and Their Habitats. Consequently, these two units will be merged, covering all objectives and learning components.</td></tr>
<tr><td>Prior Learning Requirements:<br><br>• Know the names for the main parts of the body.<br>• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.<br>• Identify and name a variety of common animals that are</td><td colspan="2">Common Misconceptions (PLAN):<br><br>Some children may think:<br><br>• A baby grows in a mother's tummy<br>• A baby is "made".</td></tr>
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| | |
|---|---|
| carnivores, herbivores and omnivores.<br>• Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)<br>• Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.<br>• Animals, including humans, have offspring, which grow into adults.<br>• Know the basic needs of animals, including humans, for survival (water, food and air).<br>• Humans and some other animals have skeletons and muscles for support, protection and movement. | |
| **Biographical Study - Scientist:**<br><br>None. | **Key Vocabulary (Linked to PLAN) (Full list on Vocabulary progression document):**<br><br>• **Life Cycle:** The series of changes in the life of an organism including reproduction<br>• **Reproduce:** To have off-spring (children in humans).<br>• **Sexual Reproduction:** Offspring get genes from both mum and dad, inheriting a mix of features from both.<br>• **Sperm/Egg:** The male and female cells used in reproduction. They carry DNA.<br>• **Live Young:** Born without the need for eggs.<br>• **Puberty:** Is the name for the time when your body begins to develop and change as you move from childhood to adult.<br>• **Adolescence:** The transition phase between childhood and becoming an adult. These are usually teenage years.<br>• **Foetus:** A human child still developing within the mother's uterus (womb).<br>• **Infant:** A human baby.<br>• Toddler: Babies who develop the ability to sit up independently, manipulate objects, follow verbal instructions and begin to walk unaided.<br>• **Child:** A human who has not yet reached puberty / adolescence. |

| | |
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| | • **Adult:** A fully grown human capable of reproduction. |

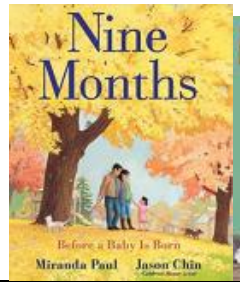
| **NC Objectives (Substantive Knowledge):** | **Working Scientifically (Disciplinary Knowledge):** |
|---|---|
| • Describe the changes as humans develop to old age.<br><br>(Humans only) | • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.<br>• Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.<br>• Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graph.<br>• Using test results to make predictions to set up further comparative and fair tests.<br>• Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.<br>• Identifying scientific evidence that has been used to support or refute ideas or arguments.<br><br>**Key enquiry types:**<br>• Pattern Seeking – Gestation periods compared to animal size.<br>• Research Using Secondary Sources of Information |

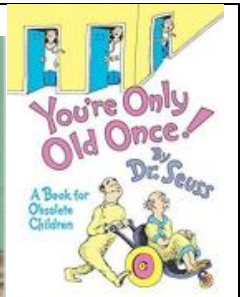
**Maths Links:**
- Conversion between months, years and weeks (gestation periods).
- Graphing (scatter graph) plotting gestation period/animal mass (kg).
- Differences in life expectancy (calculation).

**ATRR Reading Links:**
- Strand 1: Timeline Strand – human development from birth to old age and death, with key development points selected (example: puberty).
- Strand 2: Six-Word Summary (puberty, old age, gestation periods summary etc.).
- Strand 3: Emoji (Emotions at different points within the human life cycle).
- Strand 4: Impression and Evidence strand (Puberty, old age experiences).
- Strand 5: Most Important Things (Summarising information for old age, puberty etc.).

**Linked Texts:**

- Nine Months: Before a Baby is Born (Miranda Paul)
- Hair in Funny Places (Babette Cole)
- You're Only Old Once! (Dr Seuss)






**(Components) Lesson Sequence:**

LC1: What is the human life cycle? (Timeline of a human life)
LC2: What is a foetus and how do they develop?
LC3: Are gestation periods different for different mammals? (Investigation – research and pattern seeking)
LC4: How does a child develop?
LC5: What is puberty and how does it affect us? (NHS Nurse visit session).
LC6: What difficulties do people experience and encounter with old age?

**Prior Learning (Can you still?):**

**Write questions from within this unit once taught. For example:**

- List changes which occur in boys during puberty.
- List changes which occur in girls during puberty.
- Why is hygiene important during puberty?
- What changes occur during old age?
- What is a foetus?
- What is meant by gestation period?
- How do gestation periods change according to animal size?

**Previous Units:**
See above units prior learning questions (in particular, Living Things and Their Habitats).

**Previous Years (example questions linked to Biology units):**

- What is a herbivore? Give an example.
- What is an omnivore? Give an example.
- What is a carnivore? Give an example.

- Provide images of living things – create food chains and food webs.
- Show images of habitats – identify features.
- Sorting task: domesticated / wild animals.
- Naming tasks – animals and plants.
- Identification tasks – name animal and identify the type of animal (Example: Lion – Mammal)
- Provide animals or plants – create 'Yes/no' identification key.
- Name parts of plants (labelling task)
- Name parts of a flower (labelling task)
- What types of seed dispersal are there?
- What is pollination?
- What is germination? What are the different stages of it?

# Appendix 1: Year 5 Unit Specific Substantive Knowledge Overviews

## Properties and Changes of Materials

- Know how to compare materials based on the properties of hardness, solubility (how easily dissolvable it is), transparency, magnetism, conductivity of thermal (heat) and electricity.
- Know that different materials will have different purposes, based on their properties.

**Hardness**

- Know that hardness can be measured by observing if one material can scratch another.
- Know that a common scale for doing this is Moh's Hardness Scale developed in 1812
- Know how to conduct a scratch test (Investigate using rocks – link back to Y3 Rocks learning).
  1. If 'Specimen A' can scratch 'Specimen B', then 'Specimen A' is harder than 'Specimen B'.
  2. If 'Specimen A' does not scratch 'Specimen B', then 'Specimen B' is harder than 'Specimen A'. If the two specimens are equal in hardness then they will be relatively ineffective at scratching one another. Small scratches might be produced, or it might be difficult to determine if a scratch was produced.
  3. If 'Specimen A' can be scratched by 'Specimen B', but it cannot be scratched by 'Specimen C', then the hardness of 'Specimen A' is between the hardness of 'Specimen B' and 'Specimen C'.

**Solubility**

- Know that solubility is the ability of a substance to dissolve
- Know that dissolving is when a solid material mixes with a liquid and is no longer visible. Know that materials dissolved into liquid will create a solution: salt water, sugar water. Know that there is a limit to how much material can be dissolved in a given liquid. This is called saturation point. After this no more material will be dissolved it will be visible. (Investigate – which solids dissolve in water)
- Know that the hotter the solution the faster the dissolving process occurs (Investigate – number of sugar cubes dissolving in water at different temperatures).
- Know that stirring a solution can speed up the dissolving process (Investigate – number of stirs required to dissolve sugar at a given temperature).
- Know that solutions are often transparent, but the solid is still present. Revise prior vocabulary - transparent, translucent, opaque

**Magnetism**

- Revise vocab from Y3 unit - North and South poles, magnetic field, attract, repel.

| Magnetic Materials | Non-Magnetic Material |
|---|---|
| 1. Iron | 1. Aluminium |
| 2. Steel | 2. Copper |
| 3. Nickel | 3. Gold |
| | 4. Silver |

**Thermal Conductivity**

- Know that the term thermal refers to heat
- Know that a thermal conductor is a material that allows heat to be transferred easily
- Know that a thermal insulator does not conduct heat well.
- Know that a metal spoon heats up more quickly than a plastic one in a hot drink.
- Know that metal (such as aluminium and steel) conducts heat well so it is used to make saucepans so is known as a good thermal conductor.
- Know that wood does not conduct heat well so is often used for handles of saucepans. Know that plastic does not conduct heat well so is a thermal insulator.

**Electrical Conductivity**

- (Links to Y4 Electricity) Know that an electrical conductor allows electricity to flow through it, whilst an electrical insulator does not.
- Know that rubber is used for coating copper wires, as it is a poor conductor of electricity. Know that iron is used in circuits as it will conduct electricity.
- Know that silver, copper, gold and aluminium are the most effective electrical conductors.

**Separating Solids and Liquids**

- Know that solids, liquids and gases can be separated using filtering, sieving and evaporation.
- Know the following terms
  - Filtering: separates an insoluble solid from a liquid.
  - Sieving: separates solids of different sizes.
  - Evaporation: separating dissolved substances from liquids.

**Reversible and Irreversible Changes**

- Know that reversible changes are changes that are not permanent.
- Dissolving, mixing and altering states are reversible changes.
- Water can be altered from solid to liquid, to gas and back.
- Butter can be melted then will solidify. Know that solidify means 'to become a solid'
- Know that some changes result in the making of a new material, and that this is irreversible. Bread, wood, paper that is burnt cannot be returned to its original state.
- Know that cooking an egg is an example of an irreversible change.
- Know that adding acid to bicarbonate of soda results in the bicarbonate breaking down into salt, water and gas (carbon dioxide). The resulting product cannot be transformed back into its original form.

# Forces

**Gravity**

- Know that the force that pulls things to the ground on Earth (and other planets) is called gravity.
- Know that gravity acts as a pull force making unsupported objects fall towards Earth.
- Know that gravity pulls towards earth wherever you are on Earth.
- Know that gravity holds Earth and the other planets in their orbits around the Sun.

**Friction & Air Resistance**

- Know that friction occurs when objects move through water or air. Air resistance is a type of friction between air and another material (this is sometimes called drag).
- Know that as an object moves, air resistance slows it down. The faster the object's motion, the greater the air resistance exerted against it. Air resistance affects all moving objects. For example, when an aeroplane flies through the air, air particles hit the aeroplane making it more difficult for it to move through the air.
- **Galileo Galilei (Main biographical study in Space Unit)** He discovered that when you drop two objects of similar shape and size but of different masses fall at the same rate. This went against the common sense idea at the time from Aristotle who believed that heavier objects fell faster. He is said to have dropped objects from the Leaning Tower of Pisa to demonstrate this. Most scientists and historians believe this was a 'thought experiment' and did not actually happen. A 'thought experiment' is when you imagine the outcome of an experiment rather than carry it out directly.

**Isaac Newton (Biography)**

- To know that Sir Isaac Newton (1642 - 1726) was an English mathematician and scientist. He is known as one of the most influential scientists of all time. He developed Newton's law of universal gravitation.
- Know that he is said to have 'discovered' the concept of gravity when sitting under a tree and an apple fell to the ground near him. There is a common myth that the apple landed on his head which is generally considered to be untrue. Newton also discovered that white light was made from a range of colours (review previous work on rainbows and the colour spectrum).
- Know that he is buried in Westminster Abbey with other famous people Charles Dickens, Charles Darwin, Queen Elizabeth I and most recently Professor Stephen Hawking.

**Water Resistance**

- Know that water resistance acts in the same way that air resistance does. If you go swimming, there is friction between your skin and the water particles. This is known as water resistance. When something is in water, there are two forces acting on it. Its weight and the force of the water pushing up, the upthrust. If the weight is equal to or less than the upthrust, it floats. Things that float are 'buoyant'.
- Know that 'buoyancy' is the ability of an object to float in liquid or the air.
- Know that a buoy is a floating object that is used to show ships and boats where they can go and to warn them of danger.
- Know that if the weight of an object is greater than the upthrust, it sinks.
- Know how to use arrows on diagrams to show the forces at work in given situations e.g. submarine in water, parachute falling, car moving on the road.

**Levers, Pulleys and Gears**

- Know that levers, pulleys and gears are mechanisms that allow a small force to have a greater effect.
- Know that a lever is a simple mechanism used to move or lift objects.
- Know how to label a diagram showing a lever, load, effort and a fulcrum or pivot.
- Know that the nearer the fulcrum/pivot to the load then the less effort is needed.
- Know that a seesaw works because the fulcrum is in the middle.
- Consider what would happen if a seesaw had the fulcrum closer to one end.

**Gears**

- Know that gears are toothed wheels that lock together and turn each other.
- Know that gears are often different sizes.
- A number of gears connected together are called a gear train. Small gears rotate faster than large ones and need less effort to move.
- Know that gears on a bike enable us to go faster than we could normally move without using up a lot of energy.

For further information - https://www.dkfindout.com/uk/science/simple-machines/gears/

Watch examples of gears - https://www.youtube.com/watch?v=D_i3PJIYtuY

**Pulleys**

Know that a pulley is a device consisting of a wheel over which a rope or chain is pulled in order to lift heavy objects. Know that when someone raises a flag up a flagpole a pulley system is used.

# Earth and Space

**Solar System**

- Know the names of the planets in our solar system in order from the sun - Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, (Pluto – now re-classified as one of the Solar System's dwarf planets).
- Know that recently Pluto has been designated as a dwarf planet (since 2006) and is no longer included as a major planet in the solar system.
- Know the mnemonic - My Very Easy Method Just Speeds Up Naming Planets
- Know that there is an asteroid belt between Mars and Jupiter
- Know the approximate relative size of planets from this diagram.
- Know that planets have their own moons
- Know that only Earth is habitable.
- The gas giants are: Jupiter, Saturn
- The ice giants are: Uranus and Neptune.
- The others are terrestrial planets: 'terra', the Latin meaning for land.

**Solar System Models**

- Know the way that ideas about the solar system have developed,
- Know how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus (heliocentric (sun-centred) model).

**Planets**

- Know that the planet names are derived from Roman and Greek mythology, except for the Earth, which is Germanic and Old English in origin.
- Mercury: named after the Roman messenger god who was known for his ability to travel quickly with wings on his feet.
- Venus: named after the goddess of love and beauty. The planet Venus is the brightest object in our sky after the sun and the moon.
- Earth: the name comes from the German word 'erde' which means ground. This is the odd one out as it is not based on Roman or Greek Mythology.
- Mars: the Roman god of war. Red is the colour of blood and war and Mars is the Red Planet. The colour is due to a type of rust in the soil.
- Jupiter: the supreme god of the ancient Romans. The planet Jupiter, the largest planet in our solar system, is named after the king of the gods,
- Saturn: the king of the Titans who ruled the world before Jupiter. Saturn has over 30 moons in orbit
- Uranus: the Roman sky god.
- Neptune: named after the Roman god of the sea. For many years, Neptune was thought to lie on the edge of the Solar System, watching over the vast oceans of space.
- Pluto: Pluto was the brother of Jupiter and Neptune and the god of the underworld. The underworld was supposed to be dark and cold just like the planet Pluto.

**Sun, Moon, Earth**

- Know that the Earth, sun and moon are approximately spherical bodies in space.
- Know that the sun is a star and the moon is a satellite, not planets.
- Know that the Earth rotates once every 24 hours.
- Know that this creates day and night as the Earth takes 24 hours to complete one spin on its axis.
- Know that the Earth orbits around the sun once every 365 and a quarter days (one year). Know that the sun is the ball of gas in the sky that the Earth goes round, and that gives us heat and light.
- Know that it is not safe to look directly at the Sun, even when wearing dark glasses
- Know that the orbit is the curved path in space that is followed by an object going round and round a planet, moon, or star
- Know that every 4 years the Earth year is 366 days long due to the 4 quarter days equalling an extra day. We refer to this as a leap year. Know that the extra day occurs on Feb 29th.
- Know that the Earth spins on an imagined axis, tilted at approximately 23° Explain how this also alters how we see the sun in different positions in the sky throughout the day, and this makes the sun look as if it is moving when it is in fact Earth.
- Know that the sun appears to rise in the east and sets in the west.

**Time Zones**

- Know that there are different time zones across the world because of the rotation of the earth.
- Know that as you move eastwards from the UK you add time on. E.g. Sydney, Australia you add 11 hours.
- Know that as you move westwards you subtract time. E.g. Los Angeles, USA you subtract 8 hours.

**Moon**

- Know that the moon is not a light source it reflects the light from the sun.
- Know that the moon orbits our Earth every 28 days, and this is called the lunar cycle.
- Know that Earth has one moon; Jupiter has four large moons and numerous smaller ones.
- (no requirement to teach the names of the phases of the moon)
- Know that over 28 days the moon goes from a full moon to a sequence of shrinking crescent moons to a new moon (not visible) a sequence of increasing crescent moons to a full moon over 28 days.
- Know that the force of gravity also exists on the Moon but it is not as strong as it is on Earth. This is because the Moon is much smaller than our planet.

**Katherine Johnson (1918-2020)**

- African-American mathematician, whose calculations helped NASA's Apollo programme reach the Moon.

**Nicolaus Copernicus (1473-1543)**

- Polish physicist and astronomer, who proved the Heliocentric Model of the Solar System.

**Galileo Galilei (1564-1642)**

- (Re-visit and link to previous learning in **Forces Unit** – Pisa object dropping experiment).
- To know that Galileo Galilei (1564 - 1642) was a scientist and engineer from Italy.
- Proved the heliocentric model of the solar system, building upon the work of Nicolaus Copernicus.
- He mapped the Moon and discovered the four largest (Galilean) moons of Jupiter. He also observed Saturn's rings after perfecting the modern telescope.

# Living Things and Their Habitats (Life Cycles)

Discussion Point: In preparation for Year 6

- Adaptation: adaptation is defined as 'the process of change by which an organism or species becomes better suited to its environment.'
- Know that piranhas have adapted to live and hunt in schools, they have sharp teeth, they have interlocking jaws, and they have an acute sense of hearing to detect prey.
- Understand the term evolution as 'the process by which different kinds of living organisms are believed to have developed from earlier forms during the history of the earth'.

- Know that adaptations can lead to evolution of species. (Explain that they will learn more about this in Year 6)

- Life processes and life cycles
- Revise the seven life processes are (MRS GREN):

| | | |
|---|---|---|
| M | Movement | All living things move, even plants. |
| R | Respiration | Getting energy from food. |
| S | Sensitivity | Detecting changes in the surroundings. |
| G | Growth | All living things grow. |
| R | Reproduction | Making more living things |
| E | Excretion | Getting rid of waste. |
| N | Nutrition | Taking in and using food. |

**Life Cycles Plants:**

- Structure of flowers, pollination (Year 3) and subsequent seed and fruit formation. Seed dispersal (Year 3 links).
- Examples of seeds and bulbs, including features of these.
- Asexual reproduction – the growth of runners from tubers (roots storing starch – example potatoes).

**Animals:**

- Features of mammals (hair/fur, lactate, warm-blooded (endotherms), give birth to live young etc.)
- Life cycle of placental mammals, marsupial mammals and monotreme mammals.

- Features of birds (beak, talons, feathers, wings, warm-blooded (endotherms), lay amniotic eggs)
- Life cycle of birds – egg-hatching-chick-adult
- Structure of amniotic eggs.

- Features of reptiles (scales, lay amniotic eggs, ectotherms (cold-blooded),
- Life cycle of reptiles –similar to birds.

- Features of amphibians (moist, permeable skin, lay eggs, undergo metamorphosis (egg-tadpole-adult), gills/lungs, webbed feet etc.).
- Life cycle of amphibians – focus on metamorphosis.

- Features of insects (Three-part body (head, thorax and abdomen), two pairs of wings (one pair may be vestigial), six legs, compound eyes, antennae, leg eggs).
- Life cycle of insects (metamorphosis – example: butterfly (egg-caterpillar-chrysalis-adult) (Non-metamorphosis – instar larvae).

# Animals, Including Humans (Puberty and Human Life Cycle)

- The study of animals, including humans regarding the changes a human goes through as they develop across their lifetime is part of the discipline of biology - the study of living organisms.
- To know that all humans grow and develop from the time they are born until old age.
- To know the terms baby, toddler, child, teenager, adolescent, adult and pensioner and the periods with which they roughly refer:
- Baby: 0 - 1 year Toddler: 1 - 3 years Child: 3 - 12 years Teenager/ adolescent: 12 - 18 years Adult: 18+ years Pensioner (old age): 65+ years
- Draw a timeline to indicate stages in the growth and development of humans.

**Gestation Periods**

- Know that nearly all mammals are viviparous - they give birth to live young rather than laying eggs.
- Know that the gestation is the development of an embryo up to the point of birth.
- Know that an embryo is an unborn animal at the very early stages of development.
- Know that an embryo develops into a foetus in the mother's womb and that over time the foetus develops typical human features including arms and legs.
- Know that the gestation period refers to the time an embryo spends in development in the womb.
- Know that an embryo develops into a foetus (in humans this is after 8 weeks) Know the following gestation periods:

| Animal | Average Gestation Period in days | Average Gestation Period in Months |
|---|---|---|
| Rat | 21 days | Less than a month |
| Rabbit | 31 day | 1 month |
| Cat/Dog | 63 days | 2 months |
| Human | 275 days | 9 months |
| Horse | 336 days | 11 months |
| Killer Whale | 465 days | 15 months |
| Elephant | 624 days | 20 months |

- Know that the general rule is 'the bigger the animal, the longer the gestation period'
- Know that these gestation periods are averages and that sometimes this period is longer and shorter.

**Puberty (Supports RSE learning in Years 5 and 6)**

- To know that puberty is when changes occur in the body during adolescence. It is the end of the development of the body.

**Old Age**

- Know that there are a number of changes as adults move into old age.
- Know that older people need a different diet to stay healthy, they may keep their teeth throughout old age, they need to exercise, they can learn new information.
- Know that some older people suffer from severe memory loss (become senile) Know that some older people have difficulty in moving around and may use a walking stick or frame. Know that the immune system becomes weaker in old age and it is more difficult for the body to fight off illness.
- Know that the immune system defends people against germs and microorganisms every day. In most cases, the immune system does a great job of keeping people healthy and preventing infections. However, sometimes problems with the immune system can lead to illness and infection.