St. Peter's CE Primary, Farnworth

'Learn, Sparkle & Shine.'

SCIENCE CURRICULUM: YEAR 3

2025-2026

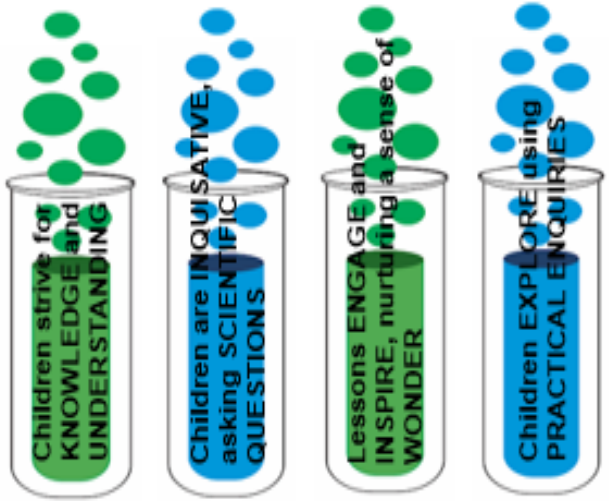
Psalm 111:2: "Great are the works of the Lord, studied by all who delight in them".

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	Autumn 2	Spring 1	Spring 2	Summer 1
Unit of Study and Key objectives (Substantive Knowledge)	**BIOLOGY:** **Animals, Including Humans (Skeletons and Muscles)** • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement. • Study and compare skeletons of: Snakes, lizard, gold fish, clown fish, horse, humans, chicken, seagull, frog, salamander (covered in classification and life cycles in Years 1 and 2).	**PHYSICS:** **Forces and Magnets** • Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing.	**CHEMISTRY:** **Rocks and Fossils** • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. • Recognise that soils are made from rocks and organic matter.	**PHYSICS:** **Light** • Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by an opaque object.. • Find patterns in the way that the size of shadows change.	**BIOLOGY:** **Plants** • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. • Investigate the way in which water is transported within plants. • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. *Trees species (local to UK)* **Recap:** daisy, daffodil, buttercup, dandelion, bean ,sycamore and cherry tree, ash, silver birch, elderflower, holly, cactus, allium and moss, carnation and hyacinth

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.

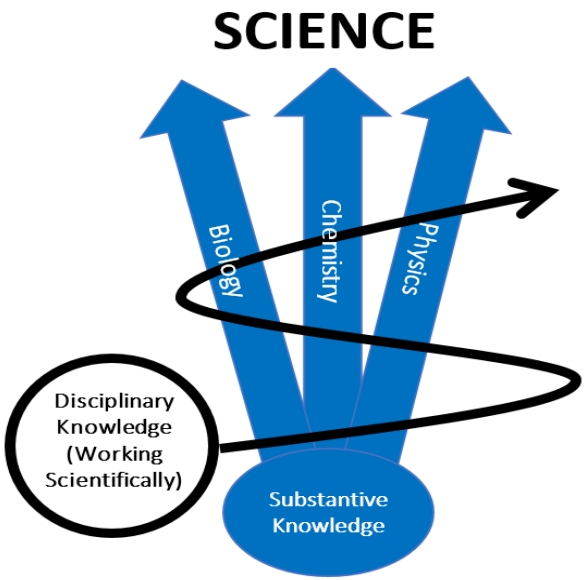
Geology*: the science that deals with the Earth's physical structure and substance, its history, and the processes that act on it.

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: Lower 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 (Y3-4):

- Asking relevant questions and using different types of scientific enquiries to answer them
- Setting up simple practical enquiries, comparative and fair tests
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- Identifying differences, similarities or changes related to simple scientific ideas and processes
- Using straightforward scientific evidence to answer questions or to support their findings.

The National Curriculum: Non-Statutory Guidance

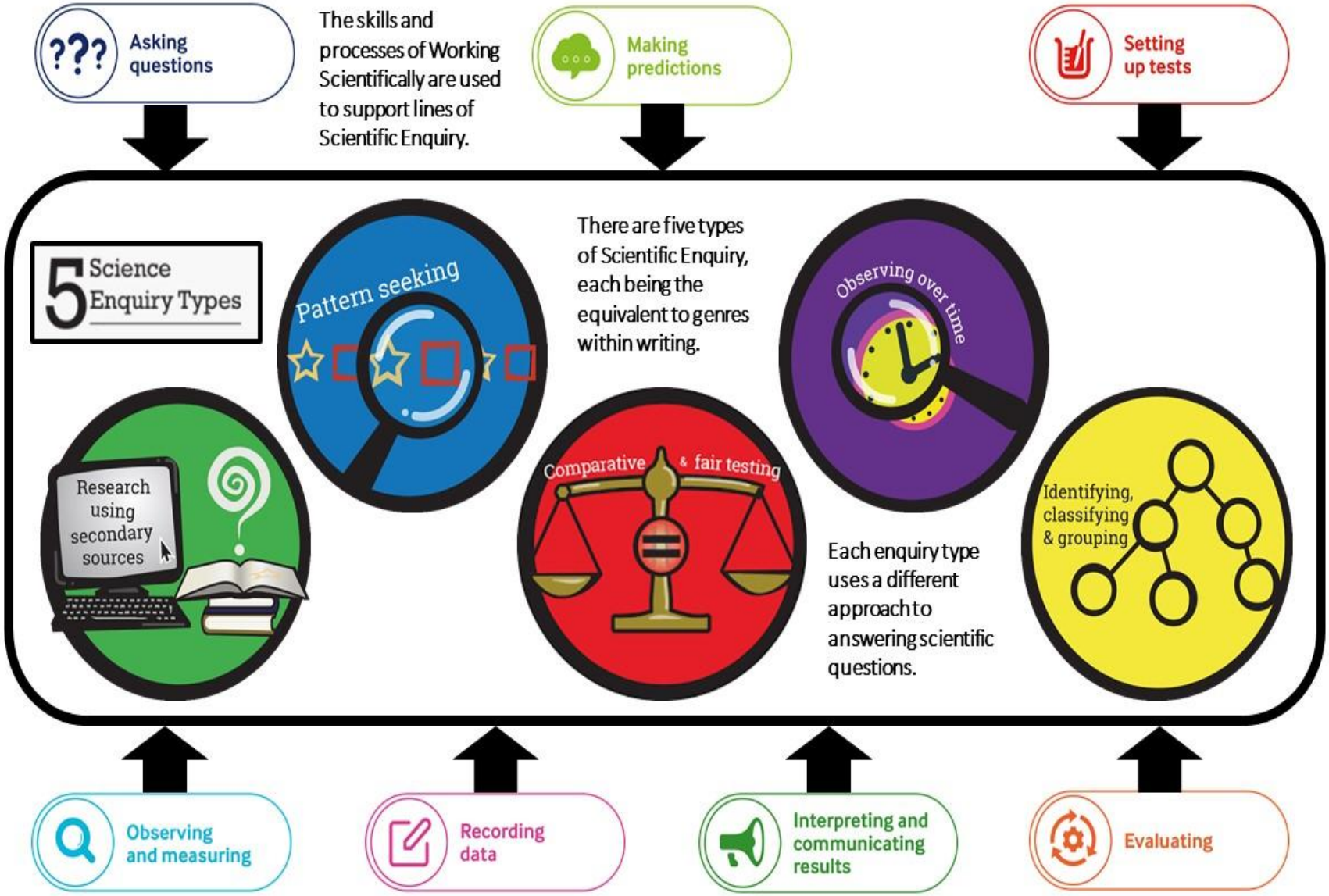
End of EYFS (YR)	Key Stage 1 (Y1/2)	Lower Key Stage 2 (Y3/4)	Upper Key Stage 2 (Y5/6)
Understanding the World **ELG: The natural World** Explore the natural world around them, making observations and drawing pictures of animals and plants. Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	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. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. 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. '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. 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. 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. 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. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out. '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. 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. 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. 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. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out 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. '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. Pupils should read, spell and pronounce scientific vocabulary correctly.

Year 3 Working Scientifically Objectives Breakdown:

	Plan		Do		Record	Review		
Year 3	Asking questions	Plan an enquiry	Making observations	Take measurements/using equipment	Gathering and presenting Evidence	Drawing conclusions	Explaining Evidence	Evaluating outcomes
	Children consider their prior knowledge when asking questions. Use a range of question stems. Where appropriate, they answer these questions. The children answer questions posed by the teacher.	Given a range of resources, the children begin to decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	Begin to make systematic and careful observations.	Use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements. Select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. Follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. **(5 types of enquiry).** **Please note:** A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome. A fair test is performed by changing a single variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.	Gather evidence to answer questions generated by themselves or the teacher. The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams. Children are supported to present the same data in different ways in order to help with answering the question.	Answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence. With support, draw conclusions based on their evidence and current subject knowledge. Use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.	Interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. Communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.	Identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry. Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.

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 3				
Biology: Animals, Including Humans (Skeletons and Muscles)	**Physics: Forces and Magnets**	**Chemistry: Rocks and Fossils**	**Physics: Light**	**Biology: Plants**
nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, skull, ribs, spine, joints	forces, push, pull, contact force, non-contact force, magnet (bar, button, ring, horseshoe), attract, repel, magnetic, magnetic strength, pole, iron, surface, friction	rock / stone, pebble, boulder, grain, crystals, layers, organic matter, permeable (absorbs water), impermeable (waterproof), soil, fossil, sedimentary rocks, metamorphic rocks, magma, igneous rocks	light, light source, dark/darkness, transparent, translucent, opaque, shiny surface, matt surface, shadow, reflect, mirror, sunlight, dangerous	leaves, photosynthesis, deciduous, evergreen, seed, seedling, seasonal change, roots, pollen, pollination, seed formation, seed dispersal, germination, flowers
Vocabulary from previous units of study (Linked)				
Year 2: Animals, Including Humans (Staying Healthy) healthy, diet, exercise, nutrients, hygiene, vegetables, fruit, carbohydrates, meat, dairy, grow, sleep, off-spring		Year 2: Uses of Everyday Materials material, properties, squashing, rigid, bending / flexible, twisting, brittle, stretching, hard, soft, rough, smooth, waterproof, absorbent, transparent, translucent, opaque, stiff	Year 1: Seasonal Changes season, spring, summer, autumn, winter, day, night, weather **Additional:** cold, sleet, hail, snow, weather forecast, weather symbols	Year 2: Plants plant, roots, bulb, seeds, blossom, stem, trunk, leaves, woodland, deciduous, evergreen
Year 1: Animals, Including Humans (Senses mammal, fish, reptile, bird, amphibian, herbivore, carnivore, omnivore, nocturnal, human, pet, senses		Year 1: Everyday Materials rough, property, smooth, material, object, hard, soft, stretchy, shiny, dull, waterproof, bendy, stiff, absorbent		Year 1: Plants plant, deciduous, evergreen, trunk, root, branch, twig, stem, seed, blossom, wild plants, garden plants, weeds, flowers, fruit, bulb, leaf / leaves

Mathematics within Science: Measuring, Recording and Representing Data

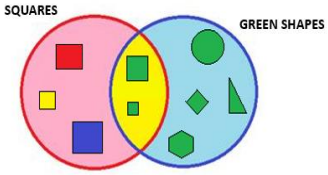
'… Scientific process is infused with maths; maths changes the look of science in a way that one cannot separate it from the other. So if maths is the language of science, then is science the reason for maths?' (Primary Science 124 Sept/Oct 2012)

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).

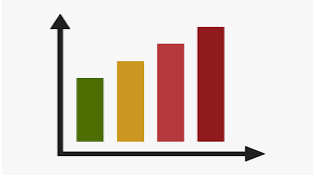
Discrete Data Representation

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

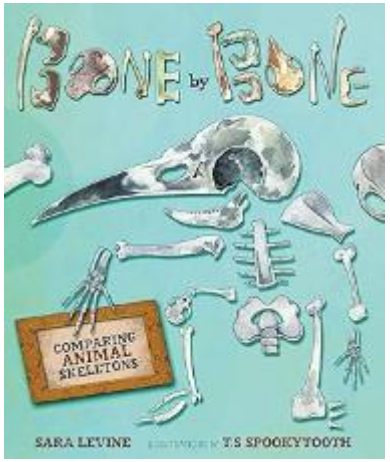
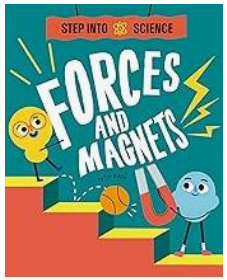
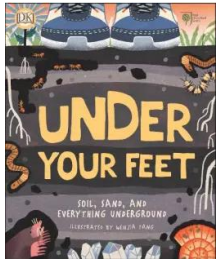
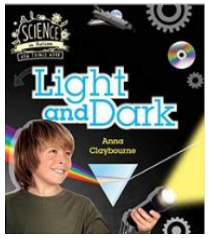
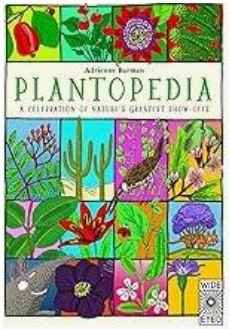
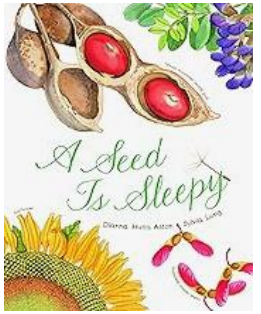
Table: Boxes (rows and columns) where numerical data can be studied.

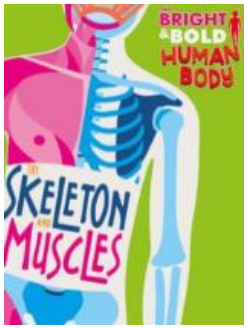
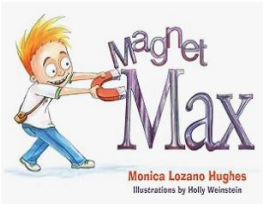
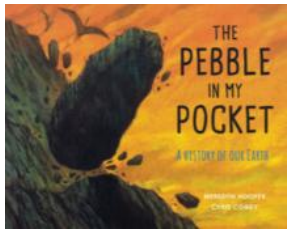
Reading within Science:

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:

Biology: Animals, Including Humans (Skeletons and Muscles)	Physics: Forces and Magnets	Chemistry: Rocks and Fossils	Physics: Light	Biology: Plants
	 	 	 	 

 **Bone by Bone: Comparing Animals Skeletons (Animal by Animal) (Sarah Levine)** **The Bright and Bold Human Body: The Skeleton and Muscles (Sonya Newland)**	 **Foxton Primary Science: Magnets and Friction (Nichola Tyrrell)** **Forces and Magnets (Step Into Science) (Peter Riley)** **Magnet Max (Learning League) (Monica Lozano & Holly Weinstein)**	 **Under Your Feet (Dr Jackie Stroud)** **The Street Beneath My Feet (Charlotte Guillian & Yuval Zommer)** **The Pebble in My Pocket: A History of Our Earth (Meredith Hooper)**	 **Light and Dark (Science in Action: How Things Work) (Anne Claybourne)** **My Shadow (Robert Louis Stevenson & Chris Yoon)** **The Dark (Lemony Snicket & Jon Klassen)**	**Plantopedia: Welcome to the Greatest Show on Earth (Adrienne Barman)** **A Seed is Sleepy (Sylvia Long)**

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 **Lower 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:	Biology: Animals, Including Humans (Skeletons and Muscles)	Physics: Forces and Magnets	Chemistry: Rocks and Fossils	Physics: Light	Biology: Plants
Linked Scientists:	**Other:** **Marie Curie (1867-1934)** (Polish-French physicist who discovered two new elements, explored radiation and invented the first mobile x-ray machine)	**Other:** **William Gilbert (1544-1603)** (English doctor who developed the theory of magnetism)	**Biographical Study:** **Mary Anning (1799-1847)** (English fossil collector and palaeontologist)	**Other:** **Percy Shaw (1890-1976)** (English inventor of the cat's eye)	**Other:** **Jan Ingenhousz (1730-1799)** (Dutch doctor and scientist who discovered the process of photosynthesis)

SCIENCE CURRICULUM GUIDANCE: YEAR 3

'Learn, Sparkle & Shine.'

Year Group: 3 **Term:** Autumn 1	**Unit of Study:** Animals, Including Humans (Skeletons and Muscles)	**Science Branch:** Biology
Composite (The Big Idea): All animals, including humans need the right types and amounts of nutrition (a balanced diet) in order to survive. Humans and other animals have skeletons and muscles for support, protection and movement.	**Context:** This biology unit builds upon prior learning in Year 1, where pupils looked at different types of animals and the five senses. Year 2 introduced how humans stay healthy and continued to learn about the wide range of animal types and their features. In this Year 3 unit, pupils learn that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. Pupils further develop their knowledge of what humans need to thrive by learning about a balanced diet, including how sugar can cause tooth decay and obesity, the food groups and their role in human development. New learning includes how humans and some other animals have skeletons and muscles for support, protection and movement. This unit is the precursor to work in Year 4 as pupils learn about the digestive system, teeth and food chains. The knowledge acquired in this unit will help pupils in Year 5 as they learn about puberty and gestation periods of animals before studying the circulatory system in year 6.	
Prior Learning Requirements: • What people need to be healthy (including food, water and sleep). • The names of the body parts (including head, arms, hands, legs etc.).	**Common Misconceptions (PLAN):** Some children may think: • Certain whole food groups like fats are 'bad' for you	

• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). • Identify, name, draw and label the parts of the human body (including ear lobe, nostril, armpit etc) and say which part of the body is associated with each sense. • Identify how animals, including humans, have offspring which grow into adults. • The basic needs of animals, including humans, for survival (water, food and air). • The importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	• Certain specific foods, like cheese are also 'bad' for you • Diet and fruit drinks are 'good' for you • Snakes are similar to worms, so they must also be invertebrates • Invertebrates have no form of skeleton.
Biographical Study - Scientist: **Possible Mention: Marie Curie (1867-1934)** (Polish-French physicist who discovered two new elements, explored radiation and invented the first mobile x-ray machine)	**Key Vocabulary (Linked to PLAN) (Full list on Vocabulary progression document):** • **Nutrition:** Nutrition involves drinking enough water and eating the right amount of items from the five main food groups in order to gain **nutrients** for growth and repair. • **Carbohydrates:** Linked sugars which provide slow release of energy to the body. • **Sugars:** The main source of energy used by all living things. • **Protein:** Molecules which the body uses to create new tissues. • **Vitamins:** Essential molecules needed by the body in order to stay healthy. • **Minerals:** Naturally occurring chemicals which are needed to keep the body healthy and working. • **Fibre:** Plant-based cellulose which helps aid human digestion. • **Water:** liquid that is essential for life. • **Fat:** A major type of food store within bodies. Found in dairy products. • **Skeleton:** The human skeleton is made of bone and grows as we grow. Our skull protects our brain and our ribs protect our heart and lungs. • **Bones:** Hard, rigid parts of the body used to support the body and work with muscles to provide movement and protection for vital organs. Where bones meet, they form **joints**. • **Muscles:** Muscles are attached to bones by tendons and help them to move. When a muscle contracts it gets shorter and pulls on the bone it is attached to. • **Skull:** The main bone found in the heads of animals. The skulls contains and protects the brain. • **Ribs:** Curved bones which form the rib cage. The rib cage is found in the chest area. It protects a person's internal organs from damage. • **Spine:** Also known as your backbone, your spine is a strong, flexible column of ring-like bones that runs from your skull to your pelvis.

NC Objectives (Substantive Knowledge):	**Working Scientifically (Disciplinary Knowledge):**
• Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement.	• Asking relevant questions and using different types of scientific enquiries to answer them. • Setting up simple practical enquiries, comparative and fair tests. • Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. • Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. • Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. • Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. • Identifying differences, similarities or changes related to simple scientific ideas and processes. • Using straightforward scientific evidence to answer questions or to support their findings. **Key enquiry types:** • Classifying and Sorting (Food types) • Research Using Secondary Sources of Information (Functions of specific bones; balanced diets etc.) • Pattern Seeking (Do taller children have larger skulls?)

Maths Links:
- Venn / Carroll diagrams (Sorting animals according to vertebrate / invertebrate and types of skeletons; sorting food types)
- Measuring (Heights in cm and skull circumference in cm)
- Use of tables to record data.
- Graphing – bar charts for heights and skull circumferences.

ATRR Reading Links:
Strand 2: Six-Word Summary (Nutrition; how muscles work; food chains etc.)
Strand 4: Impression and Evidence (Function of specific bones- example: skull)

Linked Texts:

- Bone by Bone: Comparing Animals Skeletons (Animal by Animal) (Sarah Levine)
- The Bright and Bold Human Body: The Skeleton and Muscles (Sonya Newland)

(Components) Lesson Sequence:

- LC1: What does a healthy, balanced menu look like?
- LC2: How do the diets of different animals compare? (Carnivores, herbivores, omnivores - Include simple food chain)
- LC3: What is the difference between invertebrates and vertebrates? (Include sorting opportunities; introduce exoskeletons, endoskeletons and hydrostatic skeletons)
- LC4: Why do we have a skeleton?
- LC5: Do taller children have larger skulls? (Pattern seeking)
- LC6: Are all skeletons the same? (Looking at similarities and differences between animal skeletons)
- LC7:Why do we have muscles? (Writing opportunity)
- LC8: Which muscles do we use for different activities?

Prior Learning (Can you still?):

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

- What are muscles? How do they work?
- Label key bones of the human skeleton.
- What are the five different food groups?
- Give an example of a carbohydrate? (Repeat for other food groups).
- What is a carnivore? (Substitute with herbivore or omnivore)
- What is an endoskeleton? Give an example of a creature with one. (Substitute with exoskeleton or hydrostatic skeleton)

Previous Years (example questions linked to biology units):

- Name and label parts of a plant.
- What three functions do the roots of plant have?
- How do people stay healthy?
- Name the five senses of the human body.
- Which organ is used to see/hear/smell/taste?
- Sort these animals into domestic and wild animals.
- Name a type of fish. (Substitute with mammal, amphibian, bird, reptile)
- Name a species of evergreen tree.
- Name a species of deciduous tree.
- Name an animal that is a carnivore. (Substitute with herbivore / omnivore)
- Label key parts of the human body.

<table>
<tr><td>Year Group: 3
Term: Autumn 2</td><td>Unit of Study:
Forces and Magnets</td><td>Science Branch:
Physics</td></tr>
<tr><td>Composite (The Big Idea):

Forces are used to move things, usually by pushing or pulling an object. Magnets are objects which push or pull without physically touching the object, instead using magnetic fields, which attract or repel one another.</td><td colspan="2">Context:

This unit is the first unit primarily focussed on forces as part of physics - the study of the processes that shape our world and how we use it. Pupils will have a secure knowledge of resistance and friction, are able to compare how things move on different surfaces and know that applying forces to objects can change their shape.

This Year 3 unit builds on pupils' knowledge of how things move on different surfaces with a focus on the force, friction. New learning includes magnetism, where pupils notice that some forces need contact between two objects, but magnetic forces can act from a distance. Pupils describe magnets as having two poles and observe how magnets attract or repel one another. Pupils further develop their knowledge of everyday materials (Chemistry links) as they compare and group them according to whether or not they are attracted to a magnet, and identify some magnetic materials. This unit is the precursor to work in year 5 as pupils revise magnetism and learn about thermal and electrical conductivity alongside reversible and irreversible changes.</td></tr>
<tr><td>Prior Learning Requirements:

• The shape of some materials can be changed when they are stretched, twisted, bent and squashed.
• Know how different toys move.
• Know what a force is and be able to explain that a push and pull are types of forces.
• That when forces are applied to an object, they allow them to move or stop moving.
• The strength of the force determines how far and fast an object moves.</td><td colspan="2">Common Misconceptions (PLAN):

Some children may think:

• The bigger the magnet the stronger it is
• All metals are magnetic.</td></tr>
</table>

Biographical Study - Scientist:

Possible Mention: William Gilbert (1544-1603) (English doctor who developed the theory of magnetism)

Key Vocabulary (Linked to PLAN) (Full list on Vocabulary progression document):

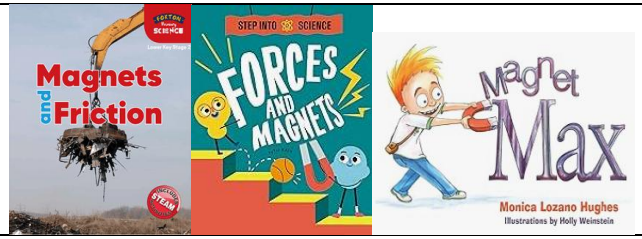
- **Forces:** Power or energy used to move something, usually by pushing or pulling.
- **Push:** An object is moved away from something.
- **Pull:** An object is moved towards something.
- **Contact Force:** A push or pull which touches the object being moved.
- **Non-Contact Force:** A push or pull which does not touch the object being moved.
- **Magnet:** An object that has the power to pull items made of iron towards it. These can come in different shapes: bar, ring, button and horseshoe.
- **Attract:** Pulls objects together. Opposite poles attract (North and South).
- **Repel:** Repulsion is a force what pushes objects away from one another. Similar poles repel (North-North and South-South).
- **Magnetic:** Objects, which are attracted to a magnet, are magnetic. They usually contain the metals iron, nickel or cobalt.
- **Magnetic Strength:** The pull strength of a magnet.
- **Pole:** The North and South poles are opposite ends of a magnet. The magnetic field flows from North to South.
- **Iron:** A common type of metal, which is magnetic. The Earth's magnetic field is due to the core and mantel being made out of iron.
- **Surface:** The top layer of something.
- **Friction:** A force acting between two surfaces moving, or trying to move, past each other.

NC Objectives (Substantive Knowledge):

- Compare how things move on different surfaces
- Notice that some forces need contact between two objects, but magnetic forces can act at a distance
- Observe how magnets attract or repel each other and attract some materials and not others
- Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
- Describe magnets as having two poles predict whether two magnets will attract or repel each other, depending on which poles are facing.

Working Scientifically (Disciplinary Knowledge):

- Asking relevant questions and using different types of scientific enquiries to answer them.
- Setting up simple practical enquiries, comparative and fair tests.
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
- Identifying differences, similarities or changes related to simple scientific ideas and processes.
- Using straightforward scientific evidence to answer questions or to support their findings.

	Key enquiry types: • Pattern Seeking (Interactions of magnetic poles; magnetic / non-magnetic materials) • Comparative and Fair Testing (Surface area affecting friction; strength of magnets)
Maths Links: Measures – distances (distance travelled by object on different surfaces; distance of effective magnetic force) Sorting – Venn (Magnetic / non-magnetic materials; pushes / pulls)	
ATRR Reading Links: Strand 2: Six-Word Summary (Friction, magnetism summaries)	
Linked Texts: • Foxton Primary Science: Magnets and Friction (Nichola Tyrrell) • Forces and Magnets (Step Into Science) (Peter Riley) • Magnet Max (Learning League) (Monica Lozano & Holly Weinstein)	
(Components) Lesson Sequence: • LC1: What is a force? (Introduction to pushes and pulls) • LC2: (Investigation) How does surface area affect friction? • LC3: How do two magnets interact with one another? • LC4: Which materials are attracted to magnets? • LC5: (Investigation) Which is the strongest magnet?	

Prior Learning (Can you still?):

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

- What is a force?
- What can forces do?
- Sort these forces into pushes and pulls.
- What is friction?
- Which surface will create the greatest friction? (Use images)
- How will these magnetic poles interact? (Show images – attract or repel)
- Which material is magnetic? / Name a magnetic material.

Previous Unit:

- See prior learning section of the Year 3 unit: Animals, Including Humans.

Previous Years (example questions linked to physics units):

- Name the four seasons in order.
- Six-word summary – Spring (Substitute with Autumn, Winter and Summer)
- How does the amount of daylight change throughout the year?
- Describe each season (similar to the aforementioned six-word summary)

Previous Years (example questions linked to chemistry units):

- Identify the materials that objects are made out of.
- Write three properties of the material wood. (Substitute with other materials such as plastic, metal, rock etc.)
- Why has _____ (insert material) been used to make this object (insert name of object)?

Year Group: 3 **Term:** Spring 1	**Unit of Study:** Rocks and Fossils	**Science Branch:** Chemistry
Composite (The Big Idea): Rocks are formed in the Earth's crust and they have different properties. Soils are formed from the breakdown of rocks and decaying organic matter. Fossils are formed when dead animals are trapped within rocks.	**Context:** This chemistry unit is the third of five science units where pupils study materials. Prior to this unit, children have developed their understanding of everyday materials (wood, metal, rocks, plastics etc.) and their properties (Years 1 and 2). They have also learnt the difference between objects and materials and know why some materials are selected to make specific objects based on their properties (Year 2). This includes focussed studies on Charles Mackintosh (Year 1) and John Boyd Dunlop (Year 2) with their inventions of the waterproof raincoat and the pneumatic tyre respectively. This year 3 unit builds on pupils' knowledge of properties of materials as pupils learn about rocks, soils and fossils. New learning includes comparing and grouping together different kinds of rocks on the basis of their appearance and simple physical properties. Pupils describe how fossils form when organisms that have died become trapped within rock and recognise that soils are made from rocks and decomposed organic matter. The knowledge acquired of rocks and soils during this unit will help pupils understand the significance of the life and works of palaeontologist Mary Anning. This unit is the precursor to work studied in Year 4 as pupils begin to study materials in terms of states of matter (solids, liquids and gases). Finally, by Year 5, pupils learn about dissolving, mixing and changes of state, and reversible and irreversible changes. Pupils also build on previous knowledge of magnetic and non-magnetic metals.	
Prior Learning Requirements: • What materials some objects are made from. • How to give simple descriptions of materials. • Which materials are made/ natural. • The properties of common materials. • How the shape of solids can be changed by squashing, bending, twisting and stretching.	**Common Misconceptions (PLAN):** Some children may think: • Rocks are all hard in nature. • Rock-like, man-made substances such as concrete or brick are rocks. • Materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer 'natural'. • Certain found artefacts, like old bits of pottery or coins, are fossils. • A fossil is an actual piece of the extinct animal or plant. • Soil and compost are the same thing.	

Biographical Study - Scientist:

Mary Anning (1799-1847) (English fossil collector and palaeontologist)

Key Vocabulary (Linked to PLAN) (Full list on Vocabulary progression document):

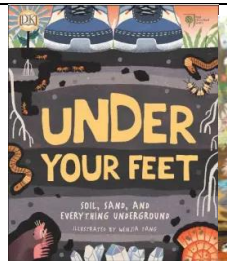
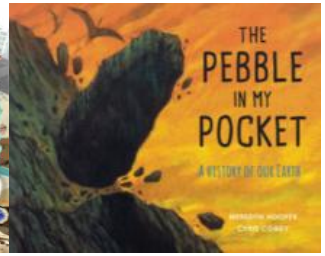
- **Rock/Stone:** A hard material formed out of minerals in the Earth's crust. There are three types of rocks: sedimentary, igneous and metamorphic.
- **Pebble:** A small rock.
- **Boulder:** A large rock, not usually moveable by hand.
- **Grain:** Tiny pieces of rock which form sands.
- **Crystal:** Metamorphic rocks or solidified minerals which has symmetry and are often colourful and transparent.
- **Layers**: A thickness of material which sits upon other materials beneath it.
- **Organic Matter**: Organic matter is matter that has come from a recently living organism. It is capable of decaying.
- **Permeable** (Absorbs Water): Allows water to soak into it.
- **Impermeable** (Waterproof): Water cannot soak into the material, instead, it simple runs off of the surface.
- **Soil**: Soil consists of a mix of organic material (decayed plants and animals) and broken bits of rocks and minerals.
- **Fossil**: A fossil is the preserved remains or traces of a dead plant or animal.
- **Sedimentary Rocks**: Sedimentary rocks are made when sand, mud and pebbles get laid down in layers. **Igneous Rocks:** Igneous rock is formed when hot magma from the Earth's mantle cools and solidifies. It may do this above or below the Earth's surface.
- **Metamorphic Rocks**: When a rock experiences heat and pressure, it becomes a metamorphic rock. All metamorphic rocks start as either sedimentary or igneous rock.
- **Magma**: Hot, liquid rock found within the Earth's mantle. When magma comes to the surface of the crust, it is called lava.

NC Objectives (Substantive Knowledge):

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

Working Scientifically (Disciplinary Knowledge):

- Asking relevant questions and using different types of scientific enquiries to answer them.
- Setting up simple practical enquiries, comparative and fair tests.
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

	• Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. • Identifying differences, similarities or changes related to simple scientific ideas and processes. • Using straightforward scientific evidence to answer questions or to support their findings. **Key enquiry types:** • Classifying and Sorting: Features of rocks; type of rocks. • Comparative and Fair Testing: Moh's hardness test. • Observations Over Time: Composition of rocks and soils. • Research Using Secondary Sources of Information: Fossil research.
Maths Links: • Venn / Carroll diagrams (Sorting rocks) • Time and Place Value (Linked to millions of years – Note: place values of this magnitude are a Y5/6 maths objective) • Tables – record findings (example: hardness test)	
ATRR Reading Links: Strand 1: Timeline (Fossil formation; Sedimentary rock formation; Life of Mary Anning) Strand 2: Six-Word Summary (Igneous/sedimentary/metamorphic rock formation; fossil formation; soil formation) Strand 4: Impression and Evidence (Fossils) Strand 5: 3/5 Most Important Things (Mary Anning's life)	
Linked Texts: • Under Your Feet (Dr Jackie Stroud) • The Street Beneath My Feet (Charlotte Guillian & Yuval Zommer) • The Pebble in My Pocket: A History of Our Earth (Meredith Hooper)	  

(Components) Lesson Sequence:

- LC1: Do all rocks look and feel the same? (Observations of rocks)
- LC2: How can we group different types of rocks?
- LC3: Which rock would be best to rebuild the Croods' cave? (Testing properties and drawing conclusions)
- LC4: How do rocks change over time? (Weathering / erosion)
- LC5: How are fossils formed? (Link to AYRR)
- LC6: Who was Mary Anning? (Biographical Account – extended writing)
- LC7: What is soil made up of?

Prior Learning (Can you still?):

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

- Name the three types of rock.
- How is sedimentary rock formed? Give an example.
- How is igneous rock formed? Give an example.
- How is metamorphic rock formed? Give an example.
- What is a fossil?
- How are fossils formed?
- How is soil formed?
- What is found within soil?
- How do we know which rock is the hardest?

Previous Units:

- See prior learning section of the Year 3 units: Animals, Including Humans, Forces and Magnets.

Previous Years (example questions linked to physics units):

- Name the four seasons in order.
- Six-word summary – Spring (Substitute with Autumn, Winter and Summer)
- How does the amount of daylight change throughout the year?
- Describe each season (similar to the aforementioned six-word summary)

Previous Years (example questions linked to chemistry units):

- Identify the materials that objects are made out of.
- Write three properties of the material wood. (Substitute with other materials such as plastic, metal, rock etc.)
- Why has _____ (insert material) been used to make this object (insert name of object)?

Previous Years (example questions linked to biology units):

- Name and label parts of a plant.
- What three functions do the roots of plant have?
- How do people stay healthy?
- Name the five senses of the human body.
- Which organ is used to see/hear/smell/taste?
- Sort these animals into domestic and wild animals.
- Name a type of fish. (Substitute with mammal, amphibian, bird, reptile)
- Name a species of evergreen tree.
- Name a species of deciduous tree.
- Name an animal that is a carnivore. (Substitute with herbivore / omnivore)
- Label key parts of the human body.

<table>
<tr><td>Year Group: 3
Term: Spring 2</td><td>Unit of Study:
Light</td><td>Science Branch:
Physics</td></tr>
<tr><td>Composite (The Big Idea):

Light allows us to see. It is created by primary sources of light such as the Sun. These primary sources can be natural or man-made. When light travels, it travels in straight lines. If it hits an object, light is reflected back, enabling us to see it. Opaque objects block light, causing shadows to form behind them. Shadow length changes depending on the distances between the source and object.</td><td colspan="2">Context:

This unit is the first of two science units where pupils learn about light as part of the discipline of physics - the study of the processes that shape our world and how we use it. Pupils have a secure knowledge of the terms opaque, transparent and translucent from their work within materials units in Years 1 and 2.

This unit builds upon pupils' prior knowledge of materials as they recognise that shadows are formed when an opaque object blocks the light from a primary or secondary light source. Pupils find patterns in the way that the size of shadows changes. Children learn we need light in order to see things and that dark is the absence of light. Children also learn that light is reflected off of surfaces and they learn light from the sun can be dangerous and that there are ways to protect their eyes.

This is the precursor to work studied in Year 6 as pupils learn how shadows are formed. The knowledge acquired in this unit will help pupils to understand how light travels in straight lines and how the amount of light entering the eye is controlled by the pupil.</td></tr>
<tr><td>Prior Learning Requirements:

• Certain things produce light, usually by burning (e.g. the Sun) or electricity (e.g. street lights).
• Shiny materials do not make light but do reflect it.
• Shadows are caused when certain materials block light.</td><td colspan="2">Common Misconceptions (PLAN):

Some children may think:

• We can still see even where there is an absence of any light
• Our eyes 'get used to' the dark
• The moon and reflective surfaces are light sources
• A transparent object is a light source
• Shadows contain details of the object, such as facial features on their own shadow
• Shadows result from objects giving off darkness.</td></tr>
</table>

Biographical Study - Scientist:

Possible Mention: Percy Shaw (1890-1976)
(English inventor of the cat's eye)

Key Vocabulary (Linked to PLAN) (Full list on Vocabulary progression document):

- **Light:** Visible radiation which travels in waves, originating from primary light sources and reflecting off of secondary sources.
- **Light Source:** An object that gives off light. The main light source for the Earth is the Sun. Some other sources of light include torches, candles and lamps. Primary sources create light; Secondary sources reflect it.
- **Dark / Darkness:** An absence of light.
- **Transparent:** A property of a material where all lights passes through.
- **Translucent:** A materials which lets some, but not all light through it.
- **Opaque:** A material which blocks light.
- **Shiny Surface:** Reflects light.
- **Matt Surface:** Does not reflect light. It is dull.
- **Shadow:** A shadow is formed when an object blocks out the light. The object must be opaque or translucent to make a shadow.
- **Mirror:** Highly polished surface (glass, metal or plastic) which **reflects** light.
- **Sunlight:** Light created by the Sun (Our nearest star).
- **Dangerous:** Looking at direct sunlight can damage our eyes, possibly causing blindness.

NC Objectives (Substantive Knowledge):

- Recognise that they need light in order to see things and that dark is the absence of light.
- Notice that light is reflected from surfaces recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- Recognise that shadows are formed when the light from a light source is blocked by an opaque object find patterns in the way that the size of shadows change.

Working Scientifically (Disciplinary Knowledge):

- Asking relevant questions and using different types of scientific enquiries to answer them.
- Setting up simple practical enquiries, comparative and fair tests.
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
- Identifying differences, similarities or changes related to simple scientific ideas and processes.
- Using straightforward scientific evidence to answer questions or to support their findings.

	Key enquiry types: • Observing Over Time (Shadows changing throughout the day) • Pattern Seeking (Linked to shadow lengths) • Comparative and Fair Testing (Investigating shadow length changes)

Maths Links:

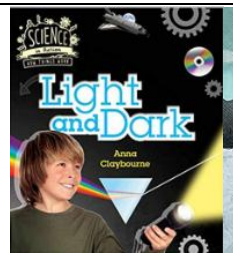
- Sorting (Venn) – primary and secondary sources of light; opaque/translucent/transparent materials etc.)
- Measures – distance (shadow length)
- Graphing – bar chart (linked to shadow lengths)

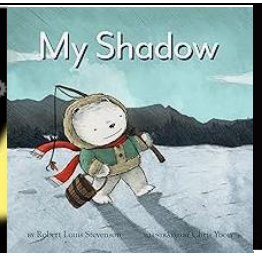
ATRR Reading Links:

Strand 1: Timeline (Shadow changes throughout the day)
Strand 2: Six-Word Summary (Shadow formation; definition of primary / secondary light sources)

Linked Texts:

- Light and Dark (Science in Action: How Things Work) (Anne Claybourne)
- My Shadow (Robert Louis Stevenson & Chris Yoon)
- The Dark (Lemony Snicket & Jon Klassen)





(Components) Lesson Sequence:

- LC1: Where does light come from? (Identifying and sorting primary and secondary (reflected) sources of light)
- LC2: Which materials are opaque, translucent and transparent? (Sorting focus)
- LC3: How do we protect ourselves from the Sun's light?
- LC4: (Over x3 lessons) How are shadows formed?
- LC5: Why do shadows change during the day?

Prior Learning (Can you still?):

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

- How does light travel?
- What is a primary light source? Give an example.
- What is a secondary light source? Give an example.
- What does opaque mean? Give an example of an opaque material. (Substitute with translucent / transparent)
- What does reflect mean?
- What is a shadow?
- How do shadows change during the day?

Previous Units:

- See prior learning section of the Year 3 units: Animals, Including Humans, Forces and Magnets, Rocks and Fossils.

Previous Years (example questions linked to physics units):

- Name the four seasons in order.
- Six-word summary – Spring (Substitute with Autumn, Winter and Summer)
- How does the amount of daylight change throughout the year?
- Describe each season (similar to the aforementioned six-word summary)

Previous Years (example questions linked to chemistry units):

- Identify the materials that objects are made out of.
- Write three properties of the material wood. (Substitute with other materials such as plastic, metal, rock etc.)
- Why has _____ (insert material) been used to make this object (insert name of object)?

Previous Years (example questions linked to biology units):

- Name and label parts of a plant.
- What three functions do the roots of plant have?
- How do people stay healthy?
- Name the five senses of the human body.
- Which organ is used to see/hear/smell/taste?
- Sort these animals into domestic and wild animals.
- Name a type of fish. (Substitute with mammal, amphibian, bird, reptile)
- Name a species of evergreen tree.
- Name a species of deciduous tree.
- Name an animal that is a carnivore. (Substitute with herbivore / omnivore)
- Label key parts of the human body.

Year Group: 3 **Term:** Summer 1	**Unit of Study:** Plants	**Science Branch:** Biology
Composite (The Big Idea): All plants start life as seeds, which must germinate (grow) underground to form adult plants. Many plants have flowers, whose role is to create off-spring in the form of seeds through a process called pollination.	**Context:** This unit is the third and final plant-focussed unit, building upon learning in Year 1 (identifying common plants, basic structure of plants) and Year 2 (continuing to identify common plant species including deciduous and evergreen trees, the role of seeds/bulbs and the requirements plants need to grow and be healthy). During this unit, pupils revise a significant amount of knowledge from Year 2: the parts of a plant/tree; the function of each part of a plant; what seeds and plants need to grow and be healthy. This unit also reviews and builds upon pupils' knowledge of germination, pollination and life cycle diagrams. New learning also includes seed formation and the four methods of seed dispersal. Pupils will also investigate water transportation within plants through xylem vessels (within vascular bundles). The knowledge acquired in this unit will help pupils to group and classify living things in Year 4. This is the precursor to work studied in Year 5 when pupils construct food chains and in Year 6 when pupils study Linnaean classification, adaptations and sexual reproduction in plants.	
Prior Learning Requirements: • What Plants need to grow. • The names of some common garden plants (e.g. poppy, rose) and some common wild plants (e.g. daisy, dandelion, nettle). • The difference between Deciduous and Evergreen trees. • The parts of a plant may include: petals, fruits, roots, bulbs, seeds, stem, trunk and branches. • The parts of plants we can eat (vegetables: leafy, root, stem, flowering; fruit; grains, cereals, nuts and seeds).	**Common Misconceptions (PLAN):** Some children may think: • Plants eat food. • Food comes from the soil via the roots. • Flowers are merely decorative rather than a vital part of the life cycle in reproduction. • Plants only need sunlight to keep them warm. • Roots suck in water, which is then sucked up the stem.	

Biographical Study - Scientist:

Possible Mention: Jan Ingenhousz (1730-1799) (Dutch doctor and scientist who discovered the process of photosynthesis)

Key Vocabulary (Linked to PLAN) (Full list on Vocabulary progression document):

- **Leaves:** Usually flat, green parts of a plant whose role is to capture sunlight in make sugar via photosynthesis.
- **Photosynthesis:** The process of making sugar using water, carbon dioxide and energy from sunlight.
- **Deciduous:** These are trees which shed (drop) their leaves in the Autumn and grow new ones in Spring. Example: Oak.
- **Evergreen:** These trees and plants do not lose their leaves in Autumn, instead they keep them all year round. Example: Conifer.
- **Seed:** Flowering plants produce seeds within fruits. The seed germinates, forming a root and shoot, growing into an adult plant.
- **Seedling:** A young, newly germinated plant from a seed, usually having a root, shoot and leaf.
- **Seasonal Change:** Changes to plant growth due to differences in the weather and temperature.
- **Roots:** The part of a plant which is found predominantly underground. Roots anchor the plant and absorb water and nutrients needed by the plant.
- **Pollen:** Fine grains from the male parts of flowers which fertilise eggs to create seeds.
- **Pollination:** The process where pollen from one plant is placed onto the female parts (stigma) of another plant.
- **Seed Formation:** The creation / growth of seeds from pollen and the eggs within flowers.
- **Seed Dispersal:** The ways in which seeds are scattered away from parent plants so that they are not in direct competition for resources.
- **Germination:** The growth of a root and shoot from a planted seed to form a seedling.
- **Flowers:** The bright, colourful parts of a plant consisting of petals and the male and female parts of a plant. They produce nectar (a sugary liquid) to attract insects to help in pollination.

NC Objectives (Substantive Knowledge):

- Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.
- Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.
- Investigate the way in which water is transported within plants.

Working Scientifically (Disciplinary Knowledge):

- Asking relevant questions and using different types of scientific enquiries to answer them.
- Setting up simple practical enquiries, comparative and fair tests.
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.

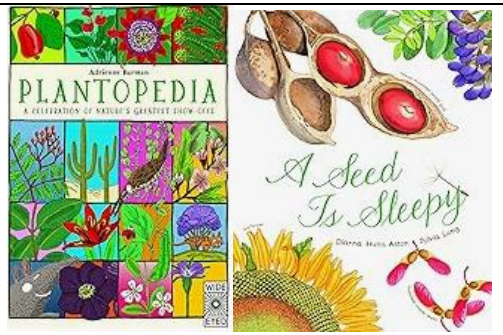
• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	• Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. • Identifying differences, similarities or changes related to simple scientific ideas and processes. • Using straightforward scientific evidence to answer questions or to support their findings. **Key enquiry types:** • Observation Over Time: Germination of seeds; growth of plants under differing conditions. • Comparative and Fair Testing: Germination of seeds; growth pf plants under differing controlled conditions. • Classification and Sorting: types of plants; seed dispersal types • Pattern Seeking: Growth conditions of plants, including nutrition.

Maths Links:
- Sorting – Venn / Carroll diagrams (types of plants)
- Measures – heights of germinating plants.
- Graphing – bar chart (seedling germination heights)
- Tables – recording data

ATRR Reading Links:
Strand 1: Timeline (Germination process; Pollination process; seed dispersal)
Strand 2: Six-Word Summary (Germination, Pollination, Seed Dispersal, Functions of different parts of the plant)
Strand 5: 3/5 Most Important Things (Plant health / growth requirements)

Linked Texts:

- Plantopedia: Welcome to the Greatest Show on Earth (Adrienne Barman)
- A Seed is Sleepy (Sylvia Long)



(Components) Lesson Sequence:

- LC1: (Recap lesson – required for Y4 and Y6 classifying) What are plants? (Explore a range of common flowering / non-flowering plants, including evergreen and deciduous trees)
- LC2: What are the functions of the parts of a plant?
- LC3: What do plants need to grow well?
- LC4: Why do plants need flowers? (Pollination processes)
- LC5: How do plants disperse their seeds?
- LC6: (Investigation) Do plants need leaves to grow?
- LC7: (Investigation) What exactly do plants need to survive?

Prior Learning (Can you still?):

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

- What is germination?
- What do plants need in order to grow?
- What is pollination?
- What types of pollination are there?
- Name four the types of seed dispersal.
- How does water and sugar move around the plant?
- How do plants make their own food?

Previous Units:

- See prior learning section of the Year 3 units: Animals, Including Humans, Forces and Magnets, Rocks and Fossils, Light.

Previous Years (example questions linked to physics units):

- Name the four seasons in order.
- Six-word summary – Spring (Substitute with Autumn, Winter and Summer)
- How does the amount of daylight change throughout the year?
- Describe each season (similar to the aforementioned six-word summary)

Previous Years (example questions linked to chemistry units):

- Identify the materials that objects are made out of.
- Write three properties of the material wood. (Substitute with other materials such as plastic, metal, rock etc.)
- Why has _____ (insert material) been used to make this object (insert name of object)?

Previous Years (example questions linked to biology units):

- Name and label parts of a plant.
- What three functions do the roots of plant have?
- How do people stay healthy?
- Name the five senses of the human body.
- Which organ is used to see/hear/smell/taste?
- Sort these animals into domestic and wild animals.
- Name a type of fish. (Substitute with mammal, amphibian, bird, reptile)
- Name a species of evergreen tree.
- Name a species of deciduous tree.
- Name an animal that is a carnivore. (Substitute with herbivore / omnivore).
- Label key parts of the human body.

Appendix 1: Year 3 Unit Specific Substantive Knowledge Overviews

Animals, Including Humans (Skeletons and muscles)

- Animals, including humans, need food, water and air to survive.
- The arrows on a food chain show the direction that the energy travels.
- Know that all animals are consumers (they eat food but cannot create it themselves) and rely on a balanced diet to maintain their health.
- Consumers eat plants and some also eat other consumers.
- Know that plants are the only organisms that can make food for themselves using the sun's energy.

- The food that animals eat gives them nutrients for body health and maintenance.
- Know that nutrients are substances that help plants and animals to grow.
- Know that different food types provide different benefits for humans.
- Fruit and vegetables provide fibre, vitamins and minerals to keep body parts working properly and maintain health.
- Know that fibre consists of the parts of plants or seeds that your body cannot digest. Fibre is useful because it makes food pass quickly through your body.

- Know that vitamins are substances that you need in order to remain healthy which are found in foods.
- Know that vitamins are known by letters and know the following information about vitamins

Vitamin	Food	Main Role
A	Milk, Cheese, butter	Healthy vision and skin
C	Orange, Lemon, tomatoes	Prevent infection
D	Milk, Cheese, Fish	Helps bone development

- Meat, fish and eggs provide protein, which is needed for healthy muscle development and maintenance.
- Milk, cheese and yoghurt provide calcium, necessary for good bone and tooth development.
- Know that fibre/vitamin rich food should be 50% of each meal, protein around 30% and calcium around 20%.
- Know that high fat and sugary food does not provide any nutritional value, and can be harmful to health.
- Know that tooth decay is caused by an excess of sugar.

- Know that mammals have skeletons and that a human is a type of mammal.
- Know what a human skeleton looks like.
- Name key parts e.g. skull/cranium, rib cage, spine, pelvis, collar bone, spine, vertebra, patella/knee cap, cartilage.

- Know that birds, fish, amphibians and reptiles also have skeletons, and that skeletons are designed to keep bodies the correct shape and help movement, as well as offer protection of organs, such as the skull protects the brain and the rib cage protects the heart in humans.
- Bird bones are hollow, making them lighter, enabling birds to fly.

- Know that humans have muscles.
- Know the name and location of the following skeletal muscles in the body - abdominal, pectoral, bicep, tricep, hamstrings, calves.
- Know that the heart is a special type of muscle called cardiac muscle.
- Know that muscles are attached to the bones, and are responsible for movement.
- Know that when muscles contract and relaxing, that this is what causes movement.
- Know that joints occur where two bones meet and are able to move together e.g. knee, elbow.

Forces and Magnets

Force

- Know that a force can be thought of as a push or a pull.
- Know that there are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed).

Friction

- Know that the texture of a surface will affect how another object moves along that surface.
- Know that smooth surfaces allow things to move quickly but rougher surfaces create a pull that keeps the object stuck there longer.
- Know that the term motion means 'moving from one place to another'
- Know that the force between two surfaces rubbing together is called friction.
- Know that a balanced force is when two forces are equal and there is no motion.
- Know that accelerate means to get faster.

- Know that decelerate means to slow down.
- Know that there are also non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force.

Magnetism

- Know that a magnet is a piece of iron or other material which attracts some metals towards it
- Know that a magnet has two poles - North and South
- Know that the word attract means one object pulling another object towards it
- Know that repel means one object pushing another object away from it
- Know that magnets have a magnetic field around them and that this is the area around a magnet where the magnetic forces work.
- Understand that magnetic forces can work at a distance and do not need to have contact. Know that when materials are drawn to magnets this is called attraction.
- Know that when materials are not drawn to magnets this is called repulsion.
- Know that magnets can come in different forms: horseshoe, ring, button, bar.
- Know the benefits of magnetic materials: sorting through different types of metals, keeping fridge doors sealed, attaching items to whiteboards without damaging them.

Rocks and Fossils

Rocks

- Know the three natural types of rocks: igneous, sedimentary and metamorphic.
- Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath. Igneous rocks are formed from the heat of lava or magma. They have large crystals. e.g. Granite and basalt
- Sedimentary rocks are formed from sediment (small pieces of rock and earth that settle at the bottom of a liquid i.e. water) being compressed by the weight of the liquid above and cementing over time. They are made of small grains. e.g. Limestone (chalk), coal and sandstone.
- Metamorphic rocks are formerly igneous or sedimentary rocks that have been changed at a chemical level due to intense heat from magma. e.g. Marble and slate.

Fossils

- Know that a fossil is the hard remains of a prehistoric animal or plant that are found inside a rock Know that fossils are comprised of body fossils (animal bones) and chemical fossils (that contain carbon and prove life once existed such as imprints in the ground and leave trace fossils behind) and understand how fossils are formed.
- Know that fossils are only found in sedimentary rock and go through the same process of compression and cementation in the ground over long periods of time.

- Know that it is very rare for living things to become fossilised. Usually after most animals die their bodies just rot away and nothing is left behind. However, under certain special conditions, a fossil can form.
- Know the sequence of fossil formation as:
- Animal dies and is buried by sediment
- Soft parts of the animal decay or decompose
- More sediment builds up around the animal and is compressed to form rock
- Bones start to be dissolved by water underground
- Minerals in the water then turn to rock

Mary Anning

- Know that Mary Anning is famous for finding many important fossils.
- Know that she was born in 1799 in Lyme Regis, Dorset which is near the coast.
- Know that 200 million years ago Dorset was beneath the sea.
- Know that her fossils helped us to understand more about prehistoric animals.
- Know the term palaeontology means 'a person who studies fossils'
- Know the term dinosaur comes from the Greek word deinos (terrible) and sauros (lizard) which, put together, makes 'terrible lizard.'
- Know that dinosaurs are actually reptiles not lizards.
- Learn about the discovery of the ichthyosaur skull and a complete plesiosaur and how this changed the view of the prehistoric (pre-written history) natural world.
- Know that previously people did not believe in dinosaurs as real, as there was no evidence. It also helped people realise the world was much older than previously thought.
- Video clips:
- https://www.bbc.com/ideas/videos/the-girl-who-helped-discoverdinosaurs/p06bfr1s
- https://www.bbc.co.uk/programmes/p015gn8

Soil

- Know that soil is a mixture of air, water, broken down rock matter and other organic material (dead or living animal tissue)
- Know the names of common soil types: sand, clay and silt.
- Know that sandy soil is dry and gritty, and does not hold onto water.
- Silty soil is richer in nutrients and smoother to the touch. It has smaller particles (a tiny piece of matter) and it can retain water for longer but will eventually start to lose this.
- Clay soil has the smallest particles and so absorbs more water. It is silky when wet but smooth and solid when dry. It contains the most nutrients as they cannot escape in water. Know that topsoil is dark in color and high in organic matter
- Know that subsoil usually appears to be lighter in colour and has a sticky texture

- Know that bedrock is the solid rock in the ground which supports all the soil above it.

Light

- Know that light is a form of energy
- Know that energy is needed to make things happen. Every movement or change, no matter how small, requires energy.
- Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another.
- Know that we need light to see things and that darkness is the absence of light
- Know that light travels in straight lines Pupils should know that we require light to see and that darkness is the absence of light.

- Know that light is reflected from surfaces (smooth, shiny surfaces reflect light more efficiently), and is not the producer of the light source itself.
- Reflection of light is when we can see the light on another surface.
- Know that light reflects off objects and enters our eyes. This is how we see.
- Know that natural sources of light include - sun, stars, fire, lightning and bioluminescence in animals (such as fireflies)
- Know that there are man-made sources of light such as light bulbs, televisions, neon signs.

- Know that many light sources give off light and heat.
- Know that the Sun gives off light and heat
- Know that looking directly at the sun is dangerous, as the light is too strong.
- Understand that Ultraviolet (UV) light causes blindness or other long term vision problems and that eyes should be protected by covering with either a wide brimmed hat/cap or sunglasses.

- Know that a rainbow occurs when it is sunny and raining.
- Know that sometimes double rainbows can occur.
- Rainbows occur when the sun is low in the sky.
- Through teacher demonstration know that light can be separated with a prism into different colours.
- Know that white light consists of many different colours. These are - Red, Orange, Yellow, Green, Blue, Indigo, Violet. This is known as the spectrum of colours.
- This can be recalled with the mnemonic ‘Richard of York Gave Battle In Vain’.
- Know that in a rainbow drops of rain act like a prism to create a rainbow.

Term	Definition	Example of material
Opaque	You cannot see through it	Wood, stone, metal
Translucent	Some light can pass through it but you cannot see clearly through it	some glass, some plastic, tissue paper
Transparent	You can see through it clearly	glass, plastic, cling film

- Understand that shadows are formed when an opaque object blocks light from passing through. This means it blocks out the light.
- Transparent and translucent objects let light through, creating no clear shadows.

Plants

- Know the following parts of a plant/tree (revision from Y2 unit) roots, stem, trunk, leaves and flower.
- Know the function of each part of a plant (revision from Year 2).
- Roots keep the plant secured within the ground and also collect water and nutrients from the soil. The stem keeps the plant upright and transports water to the leaves and flower head. The leaves collect energy from the sun to make into food. Plants are producers, as they make their food.
- Know that flowering plants are any plant that produces a flower head or fruit.

- Know the life cycle of a plant as follows - Germination > Growth > Pollination > Seed Formation > Seed Dispersal > Germination

Pollination, Seed formation and seed dispersal

- The flower is used to form seeds and attract animals for pollination.
- Insects such as bees travel from flower-to-flower drinking nectar for energy.
- Know that nectar is a sweet liquid produced by flowers, which bees and other insects collect. They collect pollen from one flower which sticks to their bodies. The grains of pollen from one plant stick to another plant and this begins the process of seed making. This is called pollination.

- After pollination over a number of days, seeds begin to form in the flower head. When the seeds are developed, they are scattered away from the parent plant through a process called seed dispersal.
- Know the importance of brightly coloured petals and flower heads as these colours can be seen by insects as 'advertisements' for food
- Know the four methods of seed dispersal:

Method	Description	Examples of seeds
Wind Dispersal	seeds are blown to a new location	sycamore, dandelion
Water Dispersal	seeds float on water to a new location	coconut
Animal Dispersal	animals carry seeds either on their skin or in their stomachs after eating to a new location	blackberry, cherry, burdock
Explosion	dry seed pods crack open and the seeds fly out to a new location	poppy, laburnum

- Identify a cactus, tulip and Venus fly trap in photographs
- Know how a cactus plant is different from a tulip. Cactuses have thicker stems as they live in arid (dry) conditions whereas tulips grow in damp conditions where access to water is much easier. Cactus plants do not rely on insects for reproduction, whereas tulips have bright leaves to attract insects.