

Year 3

Science Programme of Study

Inc. Core-Standard Coverage of Enquiry Types and 'Working Scientifically' Skills:

Enquiry Types	
Research Using Secondary Sources	✓✓✓✓
Observing Over Time	✓✓✓
Pattern Seeking	✓✓✓✓
Identifying, Classifying and Grouping	✓✓✓✓
Comparative and Fair Testing	✓✓✓✓

Working Scientifically	
Conducting Secondary Research	✓✓
Asking Questions	✓✓
Making Predictions and Hypothesising	✓✓✓
Setting up Investigations	✓✓✓
Observing and Measuring	✓✓
Recording Data	✓✓✓
Interpreting and Communicating Results	✓✓
Evaluating and Questioning Further	✓✓

Aims

‘The National Curriculum for Science’ aims to ensure that all pupils:

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

Scientific Knowledge and Conceptual Understanding:

The programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content.

Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to maximise their pupils’ engagement with and motivation to study science.

The Nature, Processes and Methods of Science:

‘Working Scientifically’ specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how ‘working scientifically’ might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data. ‘Working Scientifically’ will be developed further at key stages 3 and 4, once pupils have built up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.

Year 3– Science Programme of Study - *Timelines of Learning (The Bigger Picture)*

Unit	Prior learning...	What I will learn now...	What I don't need to learn yet...
Animals inc. Humans	<p>Pupils should already have been taught to:</p> <ul style="list-style-type: none"> Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. <i>(1-Animals, including Humans)</i> Identify and name a variety of common animals that are carnivores, herbivores and omnivores. <i>(1-Animals, including Humans)</i> Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). <i>(1-Animals, including Humans)</i> Notice that animals, including humans, have offspring which grow into adults. <i>(2-Animals, including Humans)</i> Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). <i>(2-Animals, including Humans)</i> Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. <i>(2-Animals, including Humans)</i> 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> 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. <i>(3-Animals, including Humans)</i> Identify that humans and some other animals have skeletons and muscles for support, protection and movement. <i>(3-Animals, including Humans)</i> 	<p>Pupils in Year 4 will be taught to:</p> <ul style="list-style-type: none"> Describe the simple functions of the basic parts of the digestive system in humans. <i>(4-Animals, including Humans)</i> Identify the different types of teeth in humans and their simple functions. <i>(4-Animals, including Humans)</i> Construct and interpret a variety of food chains, identifying producers, predators and prey. <i>(4-Animals, including Humans)</i> <p>Pupils in Year 6 will be taught to:</p> <ul style="list-style-type: none"> Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. <i>(6-Animals, including Humans)</i> Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. <i>(6-Animals, including Humans)</i> Describe the ways in which nutrients and water are transported within animals, including humans. <i>(6-Animals, including Humans)</i>
Forces and Magnets	<p>Pupils should already have been taught to:</p> <ul style="list-style-type: none"> Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. <i>(2-Everyday materials)</i> 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> Compare how things move on different surfaces. <i>(3-Forces)</i> Notice that some forces need contact between two objects, but magnetic forces can act at a distance. <i>(3-Forces)</i> Observe how magnets attract or repel each other and attract some materials and not others. <i>(3-Forces)</i> 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. <i>(3-Forces)</i> Describe magnets as having two poles. <i>(3-Forces)</i> Predict whether two magnets will attract or repel each other, depending on which poles are facing. <i>(3-Forces)</i> 	<p>In Year 5 pupils will be taught to:</p> <ul style="list-style-type: none"> Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. <i>(5-Forces)</i> Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. <i>(5-Forces)</i> Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. <i>(5-Forces)</i> <p>In Key Stage 3 pupils will be taught about:</p> <ul style="list-style-type: none"> Magnetic fields by plotting with compass, representation by field lines. Earth's magnetism, compass and navigation. The magnetic effect of a current, electromagnets, D.C. motors (principles only).
Light	<p>Pupils should already have been taught to:</p> <ul style="list-style-type: none"> Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. <i>(1-Animals, including Humans)</i> 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> Recognise that they need light in order to see things and that dark is the absence of light. <i>(3-Light)</i> Notice that light is reflected from surfaces. <i>(3-Light)</i> Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. <i>(3-Light)</i> Recognise that shadows are formed when the light from a light source is blocked by an opaque object. <i>(3-Light)</i> Find patterns in the way that the size of shadows change. <i>(3-Light)</i> 	<p>Pupils in Year 6 will be taught to:</p> <ul style="list-style-type: none"> Recognise that light appears to travel in straight lines. <i>(6-Light)</i> Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. <i>(6-Light)</i> Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. <i>(6-Light)</i> Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. <i>(6-Light)</i>
Plants	<p>Pupils should already have been taught to:</p> <ul style="list-style-type: none"> Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. <i>(1-Plants)</i> Identify and describe the basic structure of a variety of common flowering plants, including trees. <i>(1-Plants)</i> Observe and describe how seeds and bulbs grow into mature plants. <i>(2-Plants)</i> Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. <i>(2-Plants)</i> 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. <i>(3-Plants)</i> 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. <i>(3-Plants)</i> Investigate the way in which water is transported within plants. <i>(3-Plants)</i> Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. <i>(3-Plants)</i> 	<p>Pupils in Year 5 will be taught to:</p> <ul style="list-style-type: none"> Describe the life process of reproduction in some plants and animals. <i>(5-Plants)</i>
Rocks	<p>Pupils should already have been taught to:</p> <ul style="list-style-type: none"> Distinguish between an object and the material from which it is made. <i>(1-Everyday Materials)</i> Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. <i>(1-Everyday Materials)</i> Describe the simple physical properties of a variety of everyday materials. <i>(1-Everyday Materials)</i> Compare and group together a variety of everyday materials on the basis of their simple physical properties. <i>(1-Everyday Materials)</i> Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. <i>(2-Everyday Materials)</i> 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. <i>(3-Everyday Materials)</i> Describe in simple terms how fossils are formed when things that have lived are trapped within rock. <i>(3-Everyday Materials)</i> Recognise that soils are made from rocks and organic matter. <i>(3-Everyday Materials)</i> 	<p>In Year 6 Evolution and inheritance pupils will be taught to:</p> <ul style="list-style-type: none"> Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. <i>(6-Evolution and Inheritance)</i>

Year 3 – Science Programme of Study - *Timelines of Learning (Working Scientifically)*














	Plan		Do			Review		
Stages	Recognise the best type of enquiry to answer a question	Choose equipment, select tests, use secondary sources to decide how to obtain accurate observations and measurements	Obtain observations and measurements using equipment and/or secondary sources	Record observations and measurements	Present observations and measurements	Draw conclusions and make explanations	Evaluate the data collected	Evaluate the process used (including next steps)
Prior learning... End of Year 2	I ask simple questions and recognise these questions can be answered in different ways.	I decide with help, what to find out, observe or measure.	I observe closely, using simple equipment and non-standard units. I can identify and classify. I can perform a simple test.	I gather data and record data to help me answer my questions. I record what I have found out using e.g., words or pictures, tables or simple prepared formats.		I use my observations and ideas to suggest answers to my questions.		I talk about how I found out what I found out.
What I will learn now... End of Year 3	I can ask questions and I recognise that there are different types of enquiry.	I can set up a simple practical enquiry and I am beginning to understand how to make a test fair. I make suggestions about what observations and measurements to make and what equipment I need.	I am beginning to make systematic and careful observations. I sometimes use standard units. With help, I can use information sources provided to find things out.	I gather data and using a pre-prepared table, I can record data. I record my findings using a drawing and/or words.	With help, I can present my data.	I can use my results when I talk about what happened.		I can talk about what went wrong. I have ideas about what else I would like to find out.
What I don't need to learn yet... End of Year 4	I ask relevant questions and use different types of scientific enquiries to answer them.	I can set up simple practical enquiries, comparative or fair tests. I decide what observations and measurements to make and what equipment to use.	I use a range of equipment (including thermometers and data-loggers). I make systematic and careful observations and take accurate measurements using standard units. I use information sources provided to find things out.	I gather, record and classify data in a variety of ways to help me answer my questions. I record my findings using simple scientific language, tables, drawings and labelled diagrams.	I present my data in a variety of ways using e.g., Venn diagrams , bar charts, simple scatter graphs and keys.	I use my results to draw simple conclusions and I make predictions for new values. I communicate what I have found out using straightforward scientific ideas and I report my findings using oral and written explanations and displays.		I suggest improvements to the way I carried out the enquiry. I suggest further questions to investigate.

KEY: **NAVY BLUE** – EYFS Framework (pre-2021) or National Curriculum - statutory
RED – Non-statutory to support progression

Year 3 – Science Programme of Study – Yearly Overview (*Knowledge and Understanding*)

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Light	Forces and Magnets	Rocks	Plants		Animals inc. Humans
Year 3	<p>Recognise that they need light in order to see things and that dark is the absence of light.</p> <p>Notice that light is reflected from surfaces.</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</p> <p>Recognise that shadows are formed when the light from a light source is blocked by a solid object.</p> <p>Find patterns in the way that the size of shadows change.</p> <p>Cross Curricular Links:</p> <p><i>Maths - Measure lengths the length of shadows and compare measurements at different times of the day.</i></p>	<p>Compare how things move on different surfaces.</p> <p>Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</p> <p>Observe how magnets attract or repel each other and attract some materials and not others.</p> <p>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.</p> <p>Describe magnets as having two poles.</p> <p>Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p> <p>Cross Curricular Links:</p> <p><i>Maths - Compare measurements by collecting data relating to how a toy car travels over different surfaces and sharing with the class.</i></p> <p><i>Maths - Create block graphs to present data that has been collected or add data to a whole class spreadsheet.</i></p>	<p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p> <p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</p> <p>Recognise that soils are made from rocks and organic matter.</p> <p>Cross Curricular Links:</p> <p><i>Maths - Compare a selection of fossils by measuring their lengths and masses and research information about the largest and smallest fossils, placing them on a scaled diagram.</i></p> <p><i>Maths - Separate different soils with different sized sieves. Compare the masses of the different particles collected through each sieve. Add masses of separated matter to see if it weighs the same as the original soil before sifting. Compare the amounts of each type of matters sieved from each soil type.</i></p> <p>Geography – Identify the location of different rock formations around the world.</p>	<p>Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.</p> <p>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.</p> <p>Investigate the way in which water is transported within plants</p> <p>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> <p>Cross Curricular Links:</p> <p><i>Maths - Estimate and measure temperature, brightness, and space (area) to investigate in which environment plants grow best – record results in a table.</i></p>	<p>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.</p> <p>Identify that humans and some animals have skeletons and muscles for support, protection and movement.</p> <p>Cross Curricular Links:</p> <p><i>Maths - Show that bones are living and growing by carrying out a survey on bone length across the school. Discuss how the measures between year groups are 2 times as long etc.</i></p>	

Exemplification of 'Scientific Enquiry Types' and 'Working Scientifically'

5 Enquiry Types		Working Scientifically – Processes of Science	
	<p>Research Using Secondary Sources Where the answer is found or developed using secondary sources. This is usually where it is impossible or unsafe for pupils to fully answer with first-hand enquiries, or where confirmation of the conclusions drawn during first-hand enquires is sought. This enquiry skill helps pupils to evaluate sources, distinguish between fact and opinion and recognise conflicting evidence and bias.</p>		
	<p>Observing Over Time Pupils identify and measure events and changes in living things, materials and physical process or events. These observations may take place over time spans of minutes or hours (e.g., puddles evaporating) up to several weeks or months (e.g., rearing young chicks).</p>		<p>Asking Questions Asking questions that can be answered using a scientific enquiry. E.g., how does the road surface affect the speed at which a car travels?</p>
	<p>Pattern Seeking Pupils observe, measure and record events and systems when carrying out pattern seeking enquires. They also collect and interpret data from secondary sources. They make observations and conduct surveys where the variables can't easily be controlled for practical or ethical reasons.</p>		<p>Making Predictions and Hypothesising Using prior knowledge (inc. that developed through secondary research) to suggest what will happen in a scientific enquiry. E.g., I think that a smoother road surface will allow a car to travel faster.</p>
	<p>Identifying, Classifying and Grouping Pupils make sense of how the world is organised. Identification is the process of using differences to name something and classification is organising things into groups. Opportunities to identify arise when pupils recognise not all birds are the same for example and can identify and name them. They can then use observable and behavioural similarities to group them and add new things.</p>		<p>Setting up an Investigation Deciding on the method and equipment to use to carry out an enquiry. E.g., children may use a timing ramp, different surface coverings and a data logger to test how the road surface affects the speed at which a car travels.</p>
	<p>Comparative and Fair Testing Helps pupils explore relationship between variables. Comparative tests children compare one event with another. E.g., does the red car go faster than the green car? A fair test identifies the causal relationship between two variable. E.g., does the height of the ramp affect how quickly the toy car rolls down the ramp and everything else remains the same?</p>		<p>Observing and Measuring Using measuring equipment and the senses to make observations or take measurements relating to the enquiry. E.g., the car took 1.5 seconds to travel between point A and point B on a smooth surface.</p>
			<p>Recording Data Using tables, drawing and other means to note observations and measurements. E.g., children record the results of their investigation using a two-way table.</p>
			<p>Interpreting and Communicating Results Using information from the recorded data to say what you found out and presenting this in an appropriate form. E.g., children draw and explain a bar chart showing how the time taken for a car to travel between points A and B changes depending on the surface covering.</p>
			<p>Evaluating and Questioning Further Reflecting on the success of the enquiry approach and identifying further questions for enquiry. E.g., children may ask how the angle of the ramp may also affect the speed at which the car travels between points A and B.</p>

*Definitions adapted from 'It's not fair - or is it?' (Turner, Keogh, Lawrence & Naylor, 2011)
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Working Scientifically Symbols - © - Primary Science Teaching Trust*



The **Working Scientifically Wheel** may be used in lessons to draw attention to the focused 'working scientifically' skill being covered.

Colouring or dating a section for each focused skill provides an opportunity to check that all of the skills are covered across the year, and also track children's progress in relation to the identified skills.



Year 3 – Core Investigations– Coverage of ‘Working Scientifically’ and ‘Scientific Enquiry’

Light	Forces and Magnets	Rocks	Plants	Animals inc. Humans
<p>NC OBJ - Notice that light is reflected from surfaces.</p> <p>Enquiry Type: <i>Comparative / Fair Testing</i></p> <p>Working Scientifically Skill: <i>Recording Data</i></p> <p>(1) Investigation Overview: <i>ASE PLAN – Reflections in Everyday Life</i> Children select different materials and use a torch to explore their reflectiveness. They record their results in a table (inc. scoring system) and explain the link between a shiny material and reflection.</p>	<p>NC OBJ - Compare how things move on different surfaces.</p> <p>Enquiry Type: <i>Comparative / Fair Testing</i></p> <p>Working Scientifically Skill: <i>Interp. & Com. Results</i></p> <p>(1) Investigation Overview: <i>TAPS Focussed Assessment – Car ramps</i> Children set up a car ramp and test how far the car will travel with different surfaces before interpreting and communicating the science behind their results.</p>	<p>NC OBJ - Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p> <p>Enquiry Type: <i>Observing over time</i></p> <p>Working Scientifically Skill: <i>Recording data</i></p> <p>(1) Investigation Overview: <i>Water Drop Test</i> Children investigate which of the rocks they are investigating are permeable or impermeable and record this using an accurate system.</p>	<p>NC OBJ - Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how... [see more].</p> <p>Enquiry Type: <i>Comparative / Fair Testing</i></p> <p>Working Scientifically Skill: <i>Evaluate / Q. Further</i></p> <p>(1) Investigation Overview: <i>TAPS Focussed Assessment – How Much Water Do Plants Need?</i> Children investigate if the amount that a plant is watered affects how much it will grow.</p>	<p>NC OBJ - Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own... [see more].</p> <p>Enquiry Type: <i>Research Using Sec. Sources</i></p> <p>Working Scientifically Skill: <i>Predict & Hypothesise</i></p> <p>(1) Investigation Overview: <i>ASE Plan – Comparing Food Items by Packaging</i> Children use an online grocery website to identify levels of fat, sugar, protein, etc. in different foods before sorting based on these values as appropriate.</p>
<p>NC OBJ - Recognise that they need light in order to see things and that dark is the absence of light.</p> <p>Enquiry Type: <i>Observing Over Time</i></p> <p>Working Scientifically Skill: <i>Evaluate / Q. Further</i></p> <p>(2) Investigation Overview: <i>Ogden Trust – When is Our Classroom Darkest?</i> Children use a data logger to measure the brightness of the classroom at different points in the day, before evaluating the investigation and posing further questions.</p>	<p>NC OBJ - Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</p> <p>Enquiry Type: <i>Comparative / Fair Testing</i></p> <p>Working Scientifically Skill: <i>Observe and Measure</i></p> <p>(2) Investigation Overview: <i>TAPS Focussed Assessment – Shoe Grip</i> Children examine and compare a range of shoes, testing the shoe's grip.</p>	<p>NC OBJ - Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p> <p>Enquiry Type: <i>Identifying, Classifying and Grouping</i></p> <p>Working Scientifically Skill: <i>Asking Questions</i></p> <p>(2) Investigation Overview: <i>Ogden Trust – Rock Classification Keys</i> Children use classification keys to identify the names of different rocks, focussing specifically on asking appropriate classification questions.</p>	<p>NC OBJ - Investigate the way in which water is transported within plants.</p> <p>Enquiry Type: <i>Observing Over Time</i></p> <p>Working Scientifically Skill: <i>Set up Investigations</i></p> <p>(2) Investigation Overview: <i>TAPS Focussed Assessment – Function of a Plant Stem</i> Children make observations of the way in which water is transported inside the stem of a celery stick.</p>	<p>NC OBJ - Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own... [see more].</p> <p>Enquiry Type: <i>Identify, Classify and Group</i></p> <p>Working Scientifically Skill: <i>Interp. & Com. Results</i></p> <p>(2) Investigation Overview: <i>Own Plans – Favourite Food Groups</i> Children conduct a survey to identify children's favourite foods, before grouping into food groups and presenting results using a bar chart.</p>
<p>NC OBJ - Find patterns in the way that the size of shadows change.</p> <p>Enquiry Type: <i>Pattern Seeking</i></p> <p>Working Scientifically Skill: <i>Set up Investigations</i></p> <p>(3) Investigation Overview: <i>Ogden Trust – Shadow Puppets</i> Children set up and complete an investigation to test how the distance between a shadow puppet and screen affects the size of the puppet.</p>	<p>NC OBJ - Observe how magnets attract or repel each other and attract some materials and not others.</p> <p>Enquiry Type: <i>Pattern Seeking</i></p> <p>Working Scientifically Skill: <i>Set up Investigations</i></p> <p>(3) Investigation Overview: <i>TAPS Focussed Assessment – Strongest Magnet</i> Children explore the strength of a range of different magnets, comparing strength relative to size/shape, and working to identify if all magnets are equally strong.</p>	<p>NC OBJ - Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</p> <p>Enquiry Type: <i>Research Using Sec. Sources</i></p> <p>Working Scientifically Skill: <i>Conduct Sec. Research</i></p> <p>(3) Investigation Overview: <i>Ogden Trust – Who Was Mary Anning?</i> Children conduct secondary research to identify what Mary Anning discovered, inc. about the formation of fossils.</p>	<p>NC OBJ - Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> <p>Enquiry Type: <i>Research Using Sec. Sources</i></p> <p>Working Scientifically Skill: <i>Conduct Sec. Research</i></p> <p>(3) Investigation Overview: <i>ASE Plan – Life Cycle of Flowering Plants</i> Children research in groups and then draw what they learn about the life cycle of a flowering plant.</p>	<p>NC OBJ - Identify that humans and some animals have skeletons and muscles for support, protection and movement.</p> <p>Enquiry Type: <i>Research Using Sec. Sources</i></p> <p>Working Scientifically Skill: <i>Asking Questions</i></p> <p>(3) Investigation Overview: <i>TAPS Focussed Assessment – Skeletons</i> Children suggest ideas about differences between human skeletons and turn these ideas into questions that may be investigated.</p>
<p>NC OBJ - Recognise that shadows are formed when the light from a light source is blocked by a solid object.</p> <p>Enquiry Type: <i>Identify, Classify and Group</i></p> <p>Working Scientifically Skill: <i>Predict & Hypothesise</i></p> <p>(4) Investigation Overview: <i>TAP Focussed Assessment – Make Shadows</i> Children investigate and classify how shadows change when formed by transparent, translucent and opaque objects, inc. those of different colours.</p>	<p>NC OBJ - Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet and identify... [see more].</p> <p>Enquiry Type: <i>Identify, Classify and Group</i></p> <p>Working Scientifically Skill: <i>Predict & Hypothesise</i></p> <p>(4) Investigation Overview: <i>OWN PLANS – Which Materials are Magnetic?</i> Children select a range of everyday materials and test whether they are magnetic, recording results.</p>	<p>NC OBJ - Recognise that soils are made from rocks and organic matter.</p> <p>Enquiry Type: <i>Pattern Seeking</i></p> <p>Working Scientifically Skill: <i>Recording Data</i></p> <p>(4) Investigation Overview: <i>OWN PLANNING – investigate soils.</i> Children should explore different soils, identifying similarities and differences between them and record this using an accurate system before identifying patterns that emerge.</p>		<p>NC OBJ - Identify that humans and some animals have skeletons and muscles for support, protection and movement.</p> <p>Enquiry Type: <i>Pattern Seeking</i></p> <p>Working Scientifically Skill: <i>Observe and Measure</i></p> <p>(4) Investigation Overview: <i>Ogden Trust – How Big is Your Skull?</i> Children investigate if male humans have larger skulls than female humans before presenting results.</p>

Year
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Year 3 – Science Knowledge Builder– *Small Steps and Suggested Lesson-Level Overview*

Small Steps Overview – Light (Y3)

(1)	Recognise that they need light in order to see things and that dark is the absence of light.
(2)	Notice that light is reflected from surfaces.
(3)	Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.
(4)	Recognise that shadows are formed when the light from a light source is blocked by a solid object.
(5)	Find patterns in the way that the size of shadows change.
(6)	Providing further depth and breadth of understanding

NOTE – SOME STEPS WILL TAKE MORE THAN 60 MINUTES

Pupils will know...	Key Vocab (MUST be introduced)		
All knowledge (inc. key vocab) linked to prior learning (see page 3 for linked objectives).			
that light is essential for seeing things. (1)	Step 1	light, vision, reflect	
that light is reflected from surfaces and this allows us to see them. (2)			
that surfaces that reflect light the best are smooth, shiny and flat. (2)	Step 2	surface, smooth, shiny, flat, light source, mirror	← Core Investigation 1
that shiny objects need a light source if they are to shine. (2)			
that shiny objects are not light sources. (2)	Step 3	dark, senses	
that when it is dark other senses can be used to help us find things and identify things. (6)			
that there are many sources of light. (6)	Step 4	Sun, source, emits, lightening, firefly, light bulb, candle, fire, screen	
that some sources of light are natural and others are man-made. (6)			
that the Sun is the main source of light for the Earth. (3)	Step 5	brightness, dim,	← Core Investigation 2
that light sources vary in brightness. (2)			
that sources of light show up best in darkness / at night time. (1)	Step 6	night, daylight, eyes, retina, pupil, UV (ultraviolet)	
that objects cannot be seen in darkness. (1)			
that it is dangerous to look at the sun because it is so bright. (3)	Step 7	shadow	← Core Investigation 3
that the pupils control the amount of light entering the eyes. (6)			
that if too much light enters the eye, it can damage the retina. (6)	Step 8	transparent, translucent, opaque, shade	← Core Investigation 4
that humans can protect their eyes from the sun by wearing a wide brimmed hat or sunglasses with a high UV rating. (3)			
that you should never look directly at the Sun, regardless of the protection that you wear. (3)	Step 9	Consolidate vocabulary (re)introduced at Step 1 – Step 8	
that shadows are formed when light travelling from a source is blocked. (4)			
that shadows are similar in shape to the objects forming them. (5)			
that the size of a shadow changes as the distance between the object blocking the light and light source changes. (5)			
that opaque objects / materials do not let light through and transparent objects / materials let a lot of light through. (4)			
that different materials cast different shades of shadow. (5)			
that shadows of objects in sunlight change over the course of the day. (5)			
that shadows change in length and position throughout the day if the sun is the light source. (5)			
that when the Sun / light source is behind us, our shadow is in front. (5)			
that the higher the Sun appears in the sky, the shorter the shadow. (5)			
that the lower the Sun appears in the sky, the longer the shadow. (5)			

***Vocabulary may already have been introduced but must be covered in the given context**

Year 3 – Science Lesson Objectives

Light (Y3)

To recognise that I need light to see things, and that dark is the absence of light. ('Feely bag' investigation.)
To understand that light from the sun can be dangerous and that there are ways to protect our eyes.
To recognise that shadows are formed when the light from a light source is blocked by an opaque object.
To explore what happens when light reflects off a mirror
1.To investigate which surfaces reflect light.
2. To evaluate the success of our investigation and pose further questions. (When is Our Classroom Darkest?)
3. Find patterns in what happens to shadows when the distance between the light source and the object changes. (A creative approach to teaching science Page 111 – The great shadow size investigation).
4.Predict how shadows change when formed by transparent, translucent and opaque objects.
Assessment -

Black - Learning objective Red – Suggested Activities or useful information. Purple – Core investigations

Year 3 – Science Knowledge Builder– *Small Steps and Suggested Lesson-Level Overview*

Small Steps Overview – Forces and Magnets (Y3)

(1)	Compare how things move on different surfaces.
(2)	Notice that some forces need contact between two objects, but magnetic forces can act at a distance.
(3)	Observe how magnets attract or repel each other and attract some materials and not others.
(4)	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.
(5)	Describe magnets as having two poles.
(6)	Predict whether two magnets will attract or repel each other, depending on which poles are facing.
(7)	Providing further depth and breadth of understanding

NOTE – SOME STEPS WILL TAKE MORE THAN 60 MINUTES

Pupils will know...

Key Vocab (MUST be introduced)

All knowledge (inc. key vocab) linked to prior learning (see page 3 for linked objectives).		
that forces change the motion (movement) of an object. (2)	Step 1	motion, movement, force, direction
that an object's motion may change by going faster, slowing down, or changing direction. (2)		
that when things speed up, slow down or change direction, there is a cause [for example, a push or a pull]. (1)	Step 2	push, pull
that both pushes and pulls are examples of forces. (1)		
that forces act in different directions. (7)	Step 3	opposing force
that when objects [for example, a spring, a table] are pushed or pulled, an opposing pull or push can be felt. (1)		
that forces can be measured in different ways (show a Newton meter but do not go into detail or investigate – covered in Y5). (7)	Step 4	Newtons, speed
that some objects move more easily (smoother, faster) on some surfaces than others. (1)		
that different surfaces create different amounts of friction. (1)	Step 5	surface, smooth, rough, friction, resistance
that friction is a force that acts between two surfaces that are moving, or trying to move, across each other. (1)		
that the amount of friction created by an object moving over a surface depends on the roughness of the surface and the object, and the forces moving between them. (1)		
that different materials [for example, glass, wood, wool] create different amounts of friction and this influences what these materials are used for. (7)	Step 6	
that there are contact and non-contact forces. (2)		
that friction is a contact force but magnetism is a non-contact force. (2)	Step 7	contact force, non-contact force, magnetism
that a magnet is an object which produces magnetic force, in turn pulling magnetic objects towards it. (3)		
that a magnetic field is the area around a magnet in which magnetic objects are pulled towards the magnet. (3)	Step 8	magnet, magnetic, magnetic field
that magnetic objects are attracted to a magnet whilst non-magnetic materials are not. (4)		
that materials containing iron, nickel or cobalt metals are easiest to magnetise. (4)	Step 9	attraction (attract)
that some metals may contain different amounts of iron, nickel or cobalt metals mixed with other metals (and are therefore alloys) and this affects how easy they are to magnetise. (7)		
that magnets have two poles. (5)	Step 10	magnetise, iron, nickel, cobalt, alloy
that the north pole of one magnet is attracted to the south pole of another and vice versa (opposite poles attract). (6)		
that the north/south pole of one magnet is repelled by the north/south pole of another magnet (like poles repel). (6)		
	Step 11	pole, north, south, repulsion (repel)

← Core Investigation 1

← Core Investigation 2

← Core Investigation 3

← Core Investigation 4

*Vocabulary may already have been introduced but must be covered in the given context

Year 3 – Science Lesson Objectives

Forces and Magnets (Y3)

To identify the forces acting on objects.
To observe how magnets attract some materials.
To predict whether two magnets will attract or repel each other, depending on which poles are facing.
1. To compare how things move on different surfaces. (TAPS – car ramps)
2. Observe and measure the force between two objects. (TAPS – Shoe grip).
3. Set up an investigation to explore the strength of different magnets. (TAPS – strongest magnets)
4. To identify and group magnetic and non-magnetic materials.
Assessment – (TAPS – Balloon rocket) Children predict how far the rocket will travel with different types of string and why.

Black - Learning objective Red – Suggested Activities or useful information. Purple – Core investigations

Year 3 – Science Knowledge Builder– *Small Steps and Suggested Lesson-Level Overview*

Small Steps Overview – Rocks (Y3)

(1)	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.
(2)	Describe in simple terms how fossils are formed when things that have lived are trapped within rock.
(3)	Recognise that soils are made from rocks and organic matter.
(4)	Providing further depth and breadth of understanding

NOTE – SOME STEPS WILL TAKE MORE THAN 60 MINUTES

Pupils will know...		Key Vocab (MUST be introduced)
All knowledge (inc. key vocab) linked to prior learning (see page 3 for linked objectives).		
that beneath all surfaces there is rock. (1)	Step 1	rock, crust, mantle, outer core, inner core, igneous, sedimentary, metamorphic
that there are three types of naturally occurring rock: (1) - igneous; sedimentary; metamorphic.		
that rocks can also be man-made and the scientific name for these is anthropic rocks. that anthropic rocks include: concrete, brick, coade stone.	Step 2	anthropic rock, concrete, brick, coade stone
that different types of rock have different simple characteristics. (1) - Consider: appearance (colour, shape, size, luster [how shiny it is], etc.), hardness, texture.	Step 3	luster, hardness, texture
that rocks can be grouped according to observable characteristics. (1) that differences between rocks can be identified by testing. (1)		
that igneous rock is rock that has been formed from magma or lava. (1)	Step 4	igneous rock, magma, lava, obsidian, pumice, granite, basalt
that obsidian, pumice, granite and basalt are all types of igneous rock. (1)	Step 5	sedimentary rock, sediment, chalk, shale, sandstone, limestone
that sedimentary rock is rock that has been formed by layers of sediment being pressed down hard and sticking together. (1) that chalk, shale, sandstone and limestone are all types of sedimentary rock. (1)		
that metamorphic rock is rock that started out as igneous or sedimentary rock but changed due to being exposed to extreme heat or pressure. (1)	Step 6	metamorphic rock, marble, quartzite, gneiss, slate
that marble, quartzite, gneiss and slate are all types of metamorphic rock. (1)	Step 7	
that some rocks are permeable and others are impermeable. (1)		
that sandstone and chalk are examples of permeable rocks. (4) that slate and granite are examples of impermeable rocks. (4)		
that rocks are chosen for particular uses because of their characteristics. (4)	Step 8	
that a fossil is the preserved remains or traces of a dead organism. (2)	Step 9	palaeontology, fossil, remains, organism, fossilisation
that fossilisation is the process in which fossils are made. (2)		
that fossilisation occurs when: (2) - An animal or plant dies. - The soft parts of the animal or plant decompose, leaving the hard parts (such as the skeleton) behind. - The hard remains become buried by small particles of rock called sediment and more layers of sediment build up on top of this. - The sediment around the plant or animal remains begin to compact and turn to rock. - The remains then start to be dissolved by water seeping through the rock. - Minerals in the water replace the remains, leaving a rock replica of the original organism called a fossil.	Step 10	decompose, mineral
that fossils become exposed as a result of erosion, weathering or excavation. (2)	Step 11	erosion, weathering, excavation
that soil is the uppermost layer of the earth. (3)	Step 12	soil, organic matter, water
that soil is a mixture of minerals, air, water and organic matter. (3)		
that there are different kinds of soil depending on the rock from which they come and their composition. (4)	Step 13	composition
that different kinds of soil have different properties. (4)	Step 14	topsoil, subsoil, bedrock
that soil is found in layers, the first two of which are topsoil and subsoil. (3)		
that bedrock is found below subsoil. (3)	Step 15	clay soil, loam soil, chalky soil, peat soil
clay soil - usually sticky and has small particles; contains very few air gaps; water does not drain through it easily so usually feels wet. (3)		
loam soil - a mixture of clay, sand and decayed plant and animal matter; holds some water but still drains relatively well; has lots of small air gaps; brown in colour. (3)		
chalky soil - light brown in colour; usually contains lumps of white stone; water drains through it easily so usually feels dry. (3)		
peat soil - does not contain any rock particles; is made from very old and decayed plants; is dark and crumbly; is rich in nutrients. (3)		

← Core Investigation 1

← Core Investigation 2

← Core Investigation 3

← Core Investigation 4

*Vocabulary may already have been introduced but must be covered in the given context

Year 3 – Science Lesson Objectives

Rocks (Y3)

To compare different types of rocks.
To group rocks based on their properties.
To explain how fossils are formed.
To explain how soil is formed.
1. To investigate the permeability of rocks and record our findings.
2. To design a rock classification key by asking appropriate questions.
3. To research what Mary Manning discovered about fossils. (Who Was Mary Anning?)
4. To record the similarities and differences between different soils.
Assessment – What would be the best material for a new paved area in school?

Black - Learning objective Red – Suggested Activities or useful information. Purple – Core investigations

Year 3 – Science Knowledge Builder– *Small Steps and Suggested Lesson-Level Overview*

Small Steps Overview – Plants (Y3)

(1)	Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.
(2)	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.
(3)	Investigate the way in which water is transported within plants
(4)	Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
(5)	Providing further depth and breadth of understanding

NOTE – SOME STEPS WILL TAKE MORE THAN 60 MINUTES

Pupils will know...

Key Vocab (MUST be introduced)

All knowledge (inc. key vocab) linked to prior learning (see page 3 for linked objectives).			
that plants need healthy roots, leaves and stems to grow well. (1)	Step 1	leaves, root, stem, growth	← Core Investigation 1
that the roots, stems and leaves of a plant may vary in shape, size and general appearance. (5)			
that plants need water, but not unlimited water, for healthy growth, but this varies from plant to plant. (2)	Step 2	absorb	
that water is taken in by a plant when the roots absorb it from the soil (N.B. plants may grow in other matter, aside from soil). (1/3)			
that too much water can be harmful to a plant. (5)	Step 3	temperature, nutrients, air, space / room	
that plants need light for healthy growth, but this varies from plant to plant. (2)			
that plant growth is affected by temperature, but this varies from plant to plant. (2)			
that plants need nutrients from the soil for healthy growth, but this varies from plant to plant. (2)			
that plants need sufficient supply of air in order to grow well, but this varies from plant to plant. (2)			
that plants need adequate room in order for them to grow well, but this varies from plant to plant. (2)	Step 4	conditions	
that the appearance of plants may change if the conditions in which they are growing change. (5)			
that water is transported through the stem to other parts of the plant. (3)	Step 5	transportation	← Core Investigation 2
that water evaporates from the leaves of a plant. (3)	Step 6	evaporates	
that evaporation of water through the leaves of a plant causes more water to be absorbed by the roots. (3)			
that flowering plants have a life cycle, inc. many different stages. (4)	Step 7	flowering, flower, petal	← Core Investigation 3
that the first stage of a flowering plant's life cycle is germination. (4)			
that germination is when a seed or bulb starts to grow. (4)	Step 8	germination	
that although plants grow from seeds or bulbs, some of these may not grow whatever conditions they are in. (2)		seed, bulb	
that the next stage of a flowering plant's life cycle is growing and flowering. (4)	Step 9		
that a flower is made up of many different parts and these include: petal, stamen, anther, filament, carpel (pistil), stigma, style, ovary, ovules and sepal. (1)			
that the next stage of a flowering plant's life cycle is pollination. (4)			
that pollination is when pollen from the anther lands on the stigma and travels down the style. (4)	Step 10	pollination, pollen, pollinator, [stamen , anther, filament (male)], [carpel/pistil , stigma, style, ovary, ovule (female)], sepal	
that pollination may be caused by animals or insects, or may take place artificially. (4)			
that the next stage of a flowering plant's life cycle is fertilisation and seed formation. (4)	Step 11	fertilisation, seed formation	
that fertilisation and seed formation is when pollen joins with an ovule and a seed starts to form. (4)			
that the final stage of a flowering plant's life cycle is seed dispersal. (4)	Step 12	seed dispersal	
that seed dispersal is when a full formed seed is moved away from a parent plant. (4)			
that a seed may be dispersed by: wind, water, animals, fire, or explosion. (4)			

***Vocabulary may already have been introduced but must be covered in the given context**

Year 3 – Science Lesson Objectives

Plants (Y3)

To describe the functions of different parts of flowering plants.
To investigate what plants need to grow well. (air, light, water, nutrients from soil, and room to grow).
To compare the effect of different factors on plant growth.
1. To investigate if the amount that a plant is watered affects how much it will grow. (TAPS - How Much Water Do Plants Need?)
2. To investigate how water is transported in plants. (TAPS- Function of stem)
To name the different parts of a flower and explain their role in pollination and fertilisation.
To identify and group seeds by their method of seed dispersal (wind, animal, explosion and water).
To order the stages of the life cycle of a flowering plant.
To identify patterns in the structure of fruits that relate to how the seeds are dispersed.
3. Conduct research to find out about the life cycle of a flowering plant.
Assessment -(TAPS Year 1 Plant structure but a focusing on the parts of a flower.)

Black - Learning objective Red – Suggested Activities or useful information. Purple – Core investigations

Year 3 – Science Lesson Objectives

Animals inc. Humans (Y3)

To sort foods into food groups and find out about the nutrients that different foods provide.
1. To explore the nutritional values of different foods by gathering information from food labels.
To design a meal based on appropriate food groups.
2. To present results using a bar chart. (Favourite food survey)
To identify and group animals with and without skeletons and compare their movement.
To sort animal skeletons into groups, identifying similarities and differences.
To explain the importance of the human skeleton.
To explain how bones and muscles work together to create movement.
3. Ask questions about the differences between human skeletons (TAPS Focussed Assessment – Skeletons).
4. To investigate whether there is a pattern between the skulls of males and females.
Assessment – Explain what would happen if humans did not have skeletons.

Black - Learning objective Red – Suggested Activities or useful information. Purple – Core investigations

Year 3 - Possible Misconceptions

Year 3	Plants	Animals inc. Humans	Rocks
	<p>Some children may think:</p> <ul style="list-style-type: none"> 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. 	<p>Some children may think:</p> <ul style="list-style-type: none"> certain whole food groups like fats are 'bad' for you 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. 	<p>Some children may think:</p> <ul style="list-style-type: none"> 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.
	Light	Forces and Magnets	
	<p>Some children may think:</p> <ul style="list-style-type: none"> 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. 	<p>Some children may think:</p> <ul style="list-style-type: none"> the bigger the magnet the stronger it is all metals are magnetic. 	

Useful Resources and Websites

Name	Link / Location
<ul style="list-style-type: none"> Primary Science Teaching Trust (website) 	https://pstt.org.uk
<ul style="list-style-type: none"> Teacher Assessment in Primary Science (TAPS) 	https://pstt.org.uk/resources/curriculum-materials/assessment
<ul style="list-style-type: none"> STEM 	https://www.stem.org.uk/primary-science
<ul style="list-style-type: none"> Explorify 	https://explorify.uk
<ul style="list-style-type: none"> ReachOut CPD 	https://www.reachoutcpd.com