



**The Science Curriculum at Crowthorne – Lower Key Stage 2 Working Scientifically:**

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

NC Objective Programme of Study	Progression of Enquiry skills Lower Key Stage 2	<b>Year 3</b> Rocks and Soils Forces: Magnets Light Plants: Pollination, identifying functions and parts of plants. Explore requirements of plants Humans: Skeleton, Muscles and diet	<b>Year 4</b> <b>States of Matter: solids, liquids and gases</b> Sound Electricity: Circuits Humans and Animals: Teeth and Digestion Living Things and their Habitats: Who am I? Human Impact
<ul style="list-style-type: none"> <li>asking relevant questions and using different types of scientific enquiries to answer them</li> </ul>	<p>Raise their own relevant questions about the world around them</p> <p>Should be given a range of scientific experience including different types of science enquiries to answer questions</p> <p>Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions</p> <p>(These types of scientific enquiry should include:</p> <ul style="list-style-type: none"> <li>observing over time;</li> <li>pattern seeking;</li> <li>identifying,</li> <li>classifying and grouping;</li> <li>comparative and fair testing (controlled investigations);</li> <li>researching using secondary sources.)</li> </ul>	<p><b>Rocks and soils:</b> in conclusion writing, children think about what they would like to investigate next or find out. They investigate how long it takes for water to drain through different soils</p> <p><b>Forces:</b> in conclusion writing, children think about what they would like to investigate next or find out. They investigate how much force is needed to move their pencil case on different surfaces. Trial different methods to test the strength of a magnet; choose the best method and then compare a bar and horseshoe magnet.</p> <p><b>Light-</b> concept map at start of topic: what would you like to find out? They plan their own method to investigate how the size of a shadow can be changed. Children observe different materials and group them depending on how shiny they are and also type of shadow they produce, in separate investigations.</p> <p><b>Plants:</b> children observe changes in plants over time when they remove leaves completely, partly or not at all. They also plan and set up an investigation to observe the transport of water in plants over time.</p> <p><b>Humans:</b> children ask their own question and plan a pattern-seeking investigation to find out about an aspect of the human body</p>	<p><b>States of Matter</b> Children explore the question ‘what happens when solids are heated to different temperatures?’</p> <p><b>Sound</b> Children investigate the statement ‘Something has to move for a sound to be made’. They are asked to think about whether they agree or disagree.</p> <p>Children explore how different sounds are made and what causes them.</p> <p><b>Electricity: Circuits</b> Children explore what is needed to create a complete circuit. They think about the materials needed and what variables they will have.</p> <p><b>Teeth and digestion</b> Children become food chain detectives and determine what certain animals eat and therefore their place in the food chain. They carry out research to find out more about how food is broken down in the digestive system.</p> <p><b>Living Things and their Habitats: Who am I?</b> Children create their own investigation about minibeasts by creating their own question. E.g. ‘Do all minibeasts have wings?’</p> <p><b>Human Impact</b> Link to P4C and Geography, children discuss and ask questions relating to humans’ impact on the World around them.</p>
<ul style="list-style-type: none"> <li>setting up simple practical enquiries, comparative and fair tests</li> </ul>	<p>Set up simple practical enquiries, comparative and fair tests.</p> <p>Recognise when a simple fair test is necessary and help to decide how to set it up</p>	<p><b>Rocks and soils:</b> as a class, investigate how long it takes for water to drain through different soils. Discuss how to keep variables the same to create a fair test.</p> <p><b>Forces:</b> investigate how much force is needed to move their pencil case on different surfaces. Trial different methods to test the strength of a magnet; then choose the best method and compare a bar and horseshoe magnet. Ensure fair testing by keeping all other variables the same.</p> <p><b>Light-</b> plan own method to investigate how the size of a shadow can be changed. Observe different materials and group them depending on how shiny they are and also type of shadow they produce, in separate investigations.</p> <p><b>Plants:</b> observe changes in plants over time when they remove leaves completely, partly or not at all- ensuring this is a fair test. Plan and set up how to investigate the transport of water in plants and how this will be measured.</p>	<p><b>States of Matter</b> Children plan an investigation on the effect of different variables on how fast ice melts. Children also find out what happens when solids are heated to different temperatures.</p> <p><b>Sound</b> children explore how they hear sounds through different materials. They make their own ear gongs to explore how these work. Children also test different instruments to investigate the volume of sound made by each. Children plan and carry out an investigation into whether sounds get fainter as they move away from the sound source. Children work in groups to investigate how to change the pitch of plucked elastic bands. Children make panpipes to investigate how to use air to make high and low notes, they identify what is vibrating to make the sound.</p> <p><b>Electricity: Circuits</b> Children make circuits and then draw and label them so that they can show others in the class what they made, how it works and what they found out. They should show and name the buzzer and motor, explaining that these are different types of components. Children decide how to test</p>

		<p><b>Humans:</b> children ask their own question and plan a pattern-seeking investigation to find out about an aspect of the human body</p>	<p>materials to replace wires in a circuit, then test them and record their results.</p> <p><b>Teeth and digestion</b> Children investigate the role of each type of tooth by eating different foods and noticing which tooth does what to help break the food down.</p> <p><b>Living Things and their Habitats: Who am I?</b> Children identify minibeasts from the woodland area. They are provided with a picture sheet and work in threes to try to find as many of the minibeasts as possible and identify them.</p> <p>Children plan, carry out and reflect on their own investigation about minibeasts.</p> <p><b>Human Impact</b> Children investigate what happens when a food chain is broken through images, diagrams and videos.</p>
<ul style="list-style-type: none"> <li>making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</li> </ul>	<p>Make systematic and careful observations</p> <p>Help to make decisions about what type of observations to make, how long to make them for and the type of simple equipment that might be used</p> <p>Take accurate measurements using standard units Learn how to use a range of (new) equipment, such as data loggers/thermometers appropriately</p>	<p><b>Rocks and soils:</b> observe and describe the properties of rocks; use a sorting key to find the names of different rocks. As a class, time water drainage and use a measuring cylinder to measure water at the start and end of being drained through soil.</p> <p><b>Forces:</b> use Newton meters to measure the force needed to move a pencil case on different surfaces. Decide what they need to measure when investigating the strength of a magnet</p> <p><b>Light:</b> measure the distance of a light source from a shadow and use this to explain how this affects the shadow size.</p> <p><b>Plants:</b> observe and label the key parts of a flowering plant and observe and describe differences in leaves. Observe changes in plants over time when they remove leaves completely, partly or not at all. Grow plants from seed and observe the changes. Plan how to investigate the transport of water in plants and how this will be measured.</p> <p><b>Humans:</b> children ask their own question and plan a pattern-seeking investigation to find out about an aspect of the human body. Decide what they need to measure and observe during their investigation</p>	<p><b>States of Matter</b> Children observe a variety of different materials and use those observations to decide if the material is a solid or a liquid. Children think about what their observations tell them about gases. Children spot where condensation is happening and use what they know about changes of state to explain what they see. Children use thermometers to investigate the rate at which ice melts.</p> <p><b>Sound</b> Children observe and describe patterns seen in the pitch of different objects and instruments. Children use data loggers to record the volume of different objects.</p> <p><b>Electricity: Circuits</b> Children observe, test and describe which circuits that have been created in the class are successful, which are not and why.</p> <p><b>Teeth and digestion</b> children make simple observations of their own teeth by looking at them in a mirror and feeling them with their fingers before recording their findings on a simple diagram.</p> <p><b>Living Things and their Habitats: Who am I?</b> Children observe and describe different minibeasts found in the school woodland area using classification keys to help them.</p> <p><b>Human Impact</b> Children make observations about the environment around them; how it has changed, how parts have remained the same and how humans have impacted it.</p>
<ul style="list-style-type: none"> <li>gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> </ul>	<p>Talk about criteria for grouping, sorting and classifying; and use simple keys</p>	<p><b>Rocks and soils:</b> observe and describe the properties of rocks; use a sorting key to find the names of different rocks.</p> <p><b>Forces:</b> Group materials into 'magnetic' and 'non-magnetic' as well as considering whether all metals are magnetic.</p> <p><b>Light:</b> group materials depending on the type of shadow they create and also how shiny they are.</p> <p><b>Plants:</b> sort and classify leaves. Consider different types of seeds and their methods of dispersal.</p> <p><b>Humans:</b> group foods by type and consider the balance needed for a healthy diet. Use this knowledge to plan diet for a day for themselves and then for a specific purpose e.g. an athlete.</p>	<p><b>States of Matter</b> Children investigate the variables they have suggested to answer a question about drying materials. To make sure that the tests are fair, each group changes one variable and keeps the others the same. As the focus of this lesson is on obtaining data, not on planning a fair test, the planning is a short, teacher-directed activity using the generic fair test planner to ensure that all groups are clear about which variable they are investigating, what they will measure to collect their data and how they will make the test fair.</p> <p><b>Sound</b> Children record findings from data logger investigation when investigating 'Sounds get fainter as the distance from the sound source increases' They sort the instruments into highest and lowest pitch.</p> <p><b>Electricity: Circuits</b> Children draw and label the circuits they create, making a note of which ones were successful and why.</p> <p><b>Teeth and digestion</b> Children create food chains and begin to combine these into food webs for different habitats.</p> <p><b>Living Things and their Habitats: Who am I?</b> Children make and use keys to identify water animals from a less familiar habitat. The children group and classify the minibeasts they</p>

			<p>observed from the woodland area during the practical task. Children sort and classify invertebrates.</p> <p><b>Human Impact</b> When creating graphs about waste collection in the school, the children are encouraged to think about the following questions: How have you grouped the items? What are your categories? What is the same about all these items/ what do they all have in common? Where would you put this item? Why? Why would this item not go here? Where will you put items made from more than one material?</p>
<ul style="list-style-type: none"> <li>recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> </ul>	<p>Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse this data</p>	<p><b>Rocks and soils:</b> observe and record properties of rocks and soils, using prompt questions and word banks to be specific. Draw and label a diagram to show the set up for soil drainage investigation. Investigate fossils and classify different types based on observations and descriptions</p> <p><b>Forces:</b> record measurements in Newtons and then use these to describe the amount of force needed to move a pencil case on different surfaces. Record measures from magnet strength investigation: cm</p> <p><b>Light:</b> choose how to record material-shadow investigation. Measure the distance between a light source and an object to create a shadow and measure the size of the shadow in cm (and/or mm).</p> <p><b>Plants:</b> plan how to investigate the transport of water in plants and how this will be measured. Produce labelled diagrams to show changes (over time) in plants when leaves are removed. Annotated drawings of seedlings relating part of plant to function.</p> <p><b>Humans:</b> children ask their own question and plan a pattern-seeking investigation to find out about an aspect of the human body. Decide what they need to measure and observe during their investigation and how to record it as well as what this will show them in relation to answering their question</p> <p><b>*Geography-</b> record temperatures for different countries in South America and produce bar graphs to show this.</p> <p><b>Maths-</b> weigh different objects and then produce a bar graph to show the results</p>	<p><b>States of Matter</b> Children use Venn diagrams to sort solids, liquids and gases. Children present the data from their investigation in a bar chart which they can use to describe their findings to the rest of the class.</p> <p><b>Sound</b> Children record pitch of objects using data logger and record their findings in a bar chart.</p> <p><b>Electricity: Circuits</b> Children plan and test materials to replace the wires in a circuit and present their results in a table, Venn or Carroll diagram.</p> <p><b>Teeth and digestion</b> Children carry out activities to help them learn about the main parts of the digestive system and the correct order in which food passes through them. They draw and label diagrams using the correct scientific vocabulary. Children identify what children's teeth are like and look more closely at their own teeth. They record how many of each type of tooth they have on a labelled diagram.</p> <p><b>Living Things and their Habitats: Who am I?</b> Children make a record of the minibeasts they find in the woodland area, with drawings or photographs if possible.</p> <p><b>Human Impact</b> Children are shown a tally chart showing waste collected at a school before looking at different ways to group items of waste in their own school. Children work in groups. The activity is differentiated by data processing demand</p>
<ul style="list-style-type: none"> <li>reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</li> </ul>	<p>Use relevant simple scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences, including oral and written explanations, displays or presentations of results and conclusions</p>	<p><b>Rocks and soils:</b> own conclusion to explain what was found out about soil drainage. Explain how fossils are formed using a storyboard.</p> <p><b>Forces:</b> explain which method was the best way to investigate the strength of a magnet. Explain whether a horseshoe or bar magnet is stronger and why.</p> <p><b>Light-</b> explain which materials are opaque, translucent or transparent based on own investigation. Explain how to change the size of a shadow by moving the object closer to or further from the light source.</p> <p>Produce posters to explain how to stay safe in the sun.</p> <p><b>Plants:</b> following research into plant life cycles- present learning as a labelled diagram using scientific language. Observe carefully in order to draw and label parts of a plant and flowers. Explain the findings of the investigations about transport of water in plants and removal of leaves from plants.</p> <p><b>Humans:</b> children ask their own question and plan a pattern-seeking investigation to find out about an aspect of the human body.</p>	<p><b>States of Matter</b> Children demonstrate what they have learned about solids, liquids and gases by sorting materials. Each group will have a set of materials to handle but they will record their sorting individually, in writing, not by physically arranging the materials.</p> <p><b>Sound</b> Children explain how high and low notes are produced using vocabulary such as 'pitch, tighter, thinner, higher, thicker, looser, lower'.</p> <p><b>Electricity: Circuits</b> Children make written explanations about electricity at the beginning of the unit for the teacher to elicit their pre-existing knowledge. Children explain what happens when a circuit is connected and when one of the wires is disconnected. Children describe how a switch works using correct scientific vocabulary.</p> <p><b>Teeth and digestion</b> Children orally explain what is meant by a 'balanced diet'. Children prepare presentations that can be shown to younger children to teach them how to look after their teeth. Children present what they have learned about the digestive system using different models. They use appropriate scientific</p>

			<p>language including canine, molar, incisor, producer, consumer, predator and prey, oesophagus, intestine, stomach, rectum, anus.</p> <p><b>Living Things and their Habitats: Who am I?</b> Children become an expert on one group of vertebrates. They then share that information with each other and use what they know to classify animals</p> <p><b>Human Impact</b> Children use appropriate scientific language such as 'positive, negative, habitat, impact and biodiversity'. Children create posters or presentations for different audiences to highlight the possible dangers of litter. Children investigate habitat destruction in another part of the world, and produce an article for a newspaper as the science correspondent, focusing on the impact of the crisis on the food chain.</p>
<ul style="list-style-type: none"> <li>using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</li> </ul>	<p>With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done.</p>	<p><b>Rocks and soils:</b> predict which soil will drain the quickest and why they think that</p> <p><b>Forces:</b> predict which magnet they think will be the strongest and why. Decide on the best method to investigate the strength of a magnet and then apply to compare a bar and horseshoe magnet</p> <p><b>Light-</b> predict how the size of a shadow can be changed based on watching a video. Plan and evaluate own method to investigate how the size of a shadow can be changed.</p> <p><b>Plants:</b> predict what will happen when leaves are removed from a plant. Question / experiment to investigate the amount of light a plant needs to survive.</p> <p><b>Humans:</b> children ask their own question and plan a pattern-seeking investigation to find out about an aspect of the human body. Predict what they think is going to happen, evaluate their results and the method they used as well as thinking about what they'd like to find out next.</p>	<p><b>States of Matter</b> Children look at the data from their investigation. This will either be the table they completed in Lesson 7 or the graph from Enrichment Lesson 4, if taught. Their challenge is to find patterns, use these to answer the investigation question and think about what their findings tell us about evaporation.</p> <p>Children spot where condensation is happening and use what they know about changes of state to explain what they see.</p> <p><b>Sound</b> Children predict which type of elastic band will create the highest/lowest pitch and why. They use their understanding of pitch to create panpipes.</p> <p><b>Electricity: Circuits</b> Children predict what can be used to replace wires in a circuit thinking about which materials are conductors and insulators.</p> <p><b>Teeth and digestion</b> Using their understanding of herbivores, carnivores and omnivores, children should be able to predict the type of teeth different animals have.</p> <p><b>Living Things and their Habitats: Who am I?</b> Children discuss what makes a good classification key and create their own. Children ask their own question to investigate minibeasts; they evaluate the question and method as part of their conclusion.</p> <p><b>Human Impact</b> Children use their research to draw simple conclusions about the impact humans have on different environments.</p>
<ul style="list-style-type: none"> <li>identifying differences, similarities or changes related to simple scientific ideas and processes</li> </ul>	<p>Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them</p> <p>With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions.</p>	<p><b>Rocks and soils:</b> investigate how long it takes for water to drain through different soils by looking for patterns in results. Use a sorting key to name different types of rock.</p> <p><b>Forces:</b> investigate how much force is needed to move their pencil case on different surfaces- make links to their experience e.g. slipping on icy ground. Use results to decide whether a bar or horseshoe magnet is stronger. Investigate how magnets affect each other.</p> <p><b>Light-</b> investigate how the size of a shadow can be changed and spot patterns in results in order to decide how the distance from a light source affects shadow size. Children observe different materials and group them depending on how shiny they are and also the type of shadow they produce, in separate investigations.</p> <p><b>Plants:</b> compare different methods of seed dispersal in order to design the perfect seed. Use knowledge of flowering plants from whole topic to design a 'perfect' flowering plant.</p>	<p><b>States of Matter</b> Children identify the differences between solids, liquids and gases by understanding their properties.</p> <p><b>Sound</b> Children investigate what is needed to create a high and low pitch and apply their understanding to different objects and instruments.</p> <p><b>Electricity: Circuits</b> Children make different types of simple switches connect them into circuits and use annotated drawings to describe how they work. When they have made their switches, they will try switches made by children in the other groups and compare them.</p> <p><b>Teeth and digestion</b> Children identify which animal groups have specific types of teeth and why i.e. carnivores tend to have long sharp canines for tearing up meat.</p> <p><b>Living Things and their Habitats: Who am I?</b> Children use classification keys to identify similarities and differences between different minibeasts.</p>

		<p><b>Humans:</b> children ask their own question and plan a pattern-seeking investigation to find out about an aspect of the human body</p>	<p><b>Human Impact</b> Children use images of landscapes to identify the similarities and differences between them; how landscapes have changed over time and what has caused the changes.</p>
<ul style="list-style-type: none"> <li>using straightforward scientific evidence to answer questions or to support their findings.</li> </ul>	<p>Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations</p>	<p><b>Rocks and soils:</b> use a video reconstruction to understand how fossils are formed. Use information sheets to identify and name different types of fossils, soils and rocks (as well as a sorting key)</p> <p><b>Forces:</b> see practical use of electromagnets in a tip through a video</p> <p><b>Light:</b> research how to stay safe in the sun and the dangers of sun damage</p> <p><b>Plants:</b> use an information sheet to research the life cycle of an tree and a runner bean plant. Use video clips and information sheets to understand the role of bees, pollination and seed dispersal.</p> <p><b>Humans:</b> investigate different exercises which use different muscles in the body. Discussion when planning own investigations about whether their questions are practical to investigate. Use information sheets to understand the affects of different food groups on the body.</p>	<p><b>States of Matter</b> Children will work individually or in pairs to interpret the data logger graphs provided, identifying the boiling point and using the list of boiling points to name the material. Children use a model of the water cycle to draw a group poster showing where they think rain comes from. They think carefully about any changes of state and what might be causing them.</p> <p><b>Sound</b> Use of video to demonstrate how sound waves are created and how vibrations travel through the air.</p> <p><b>Electricity: Circuits</b> Children use images of devices that are powered by mains electricity and those that are battery powered and sort them according to how they are powered. Children make circuits, draw them and use what they have learned from the <b>model</b> to explain what is happening in them.</p> <p><b>Teeth and digestion</b> Use kitchen utensils to help model the role of each type of tooth (scissors/incisors=chop, fork/canines=tear and potato masher/molars=grind).</p> <p><b>Living Things and their Habitats: Who am I?</b> Children use images of sea creatures and group them using classification keys.</p> <p><b>Human Impact</b> Children use images of different landscapes to identify examples of positive and negative human impact.</p>