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# Riccall Curriculum - Science

| | Phase 0 ( F1 and F2) | Phase 1 (years 1/2) | Phase 2 (years 3/4) | Phase 3 (years 5/6) |
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| **Disciplinary Science 1:**<br><br>**Comparative testing**<br> | Experiment practically to find answers to questions, learning by trial and error (cause and effect)<br><br>Make careful observations of the world around them<br><br>Look at similarities and differences between things in the natural world.<br><br>Make predictions<br><br>Problem solve<br><br>Use talk to organise, connect ideas and clarify thinking<br><br>Talk about how and why things happen<br><br>Ask relevant questions and know that they can be answered in different ways.<br><br>Demonstrate curiosity by asking questions about the world around | Perform simple tests - The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher.<br><br>Guided by the teacher, children contribute ideas towards planning an investigation.<br><br>Carry a simple investigation out, with support.<br><br>Make simple predictions<br><br>Observe things carefully using simple equipment.<br><br>Draw simple conclusions and offer explanations. | Children should be able to plan a comparative test describing how they can make it a fair test by controlling variables.<br><br>Children should be given a range of scientific experiences to enable them to raise their own questions about the world around them.<br><br>Children should be able to set up simple, practical enquiries.<br><br>Children should be able to plan their own investigations, with guidance, and identify which investigation type they are using.<br><br>With support, identify new questions arising from the data making predictions for new values within the data they have collected. Find ways of improving what they have already done. | Use scientific knowledge to raise different questions and develop a line of inquiry.<br><br>Make predictions and develop hypotheses using scientific knowledge and understanding.<br><br>Select, design, plan and carry out the most appropriate types of scientific enquiries to test predictions. Recognise and control variables where necessary and explain thinking.<br><br>Use appropriate techniques, apparatus and materials during fieldwork and laboratory work.<br><br>Make their own decisions about what observations to make and what measurements to take, and over how long, using a range of methods for different investigations.<br><br>Evaluate data, showing awareness of potential sources of random and systematic error. Evaluate the reliability of methods and suggest possible improvements. Evaluate the choice of method used, the control of variables, They |

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| **Disciplinary Science 2:**<br><br>**Classifying and grouping**<br><br> | Make careful observations of the world around them<br><br>Look at similarities and differences between things in the natural world.<br><br>Sort and compare. | Observe things carefully<br><br>Identify different ways of grouping things and sort accordingly | Talk about criteria for grouping and classifying and use simple keys.<br><br>Be able to group and classify things using a variety of different criteria. | Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment.<br><br>Children present the same data in different ways in order to help with answering the question. |
| **Disciplinary Science 3:**<br><br>**Observing over time**<br><br> | Make careful observations of the world around them<br><br>Make predictions | Observe things carefully<br><br>Offer explanations for the changes they see<br><br>Offer sensible predictions based on prior observations | Make systematic and careful observations and look for naturally occurring patterns and relationships and decide what data to collect to identify them | Make their own decisions about what observations to make and what measurements to take, and over how long, using a range of methods for different investigations.<br><br>Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions. Identify results that do not fit the overall pattern and give an explanation. |

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| **Disciplinary Science 4:**<br><br>**Pattern seeking**<br><br> | Make careful observations of the world around them<br><br>Look at similarities and differences between things in the natural world.<br><br>Sort and compare<br><br>Make links | Observe things carefully<br><br>Compare things and explain their differences<br><br>Identify patterns by making links | Make systematic and careful observations and look for naturally occurring patterns and relationships and decide what data to collect to identify them | Identify patterns that might be found in the natural environment.<br><br>Present the same data in different ways in order to help with answering the question. |
| **Disciplinary Science 5:**<br><br>**Researching**<br><br> | Understand some features of non-fiction books<br><br>Understands the difference between fact and fiction | Use simple secondary sources (such as identification sheets) to name living things.<br><br>Learn new facts from non-fiction books and magazines | Recognise when and how secondary sources can be used to answer questions that cannot be answered with practical investigations.<br><br>Use books and the internet to find information about a specific subject. | Be able to independently research a set inquiry and present findings in a variety of ways.<br><br>Recognise which secondary sources will be the most useful to research their ideas and begin to separate opinion from fact.<br><br>Evaluate the credibility of secondary sources used. |

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| **Disciplinary Science 6:**<br><br>**Measuring**<br><br> | Compare and order size, volume and weight (up to 3)<br><br>Use non-standard measures for comparison. | Begin to take measurements, initially by comparisons, then using non-standard units and simple equipment.<br><br>Recognise 'biggest and smallest', 'best and worst' etc. from their data<br><br>Draw simple conclusions from their measurements | Take measurements, using standard units, with increasing accuracy, using a range of equipment, including thermometers and data loggers. Measure length, time, temperature and capacity.<br><br>Learn how to use new equipment appropriately. | Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate<br><br>The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale.<br><br>During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value)<br><br>Evaluate the precision and accuracy of measurements. |

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| **Disciplinary Science 7:**<br><br>**Recording data**<br><br> | Explaining what they have observed verbally.<br><br>Taking photographs or drawing pictures of findings | Gather and record data to help answer questions.<br><br>Record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing.<br><br>Record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs.<br><br>Classify using simple prepared tables and sorting rings. | Collect data from their own observations, using notes, simple tables and standard units.<br><br>Help to make decisions about how to record and analyse data.<br><br>Children are supported to present the same data in different ways in order to help with answering the question.<br><br>Use results to draw simple conclusions, make predictions for new values, suggest improvements and set up further comparative and fair tests. | Gather, record, classify and present data of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs, notes, drawings, labelled diagrams and keys<br><br>Record classification e.g. using tables, Venn diagrams, Carroll diagrams. |

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| **Substantive Science 8: Biology**<br><br>**Plants**<br> | Make observations and draw pictures of plants<br><br>Know that plants grow from a seed<br><br>Understand that plants need light, water, soil (nutrients) and air. | Observe and investigate some flowering plants, trees and name them<br><br>Identify the basic structure of plants including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem<br><br>Observe and describe how seeds and bulbs grow into mature plants<br><br>Find out what seeds need to grow into mature plants. | To understand what a range of flowering plants need to grow healthily.<br><br>Describe the functions of different parts:- roots, stem/trunk, leaves and flowers including transportation of water.<br><br>Explore the life cycle of flowering plants | Living things (plants and animals) are classified into broad groups based on common characteristics.<br><br>Living things produce offspring of the same kind but these vary and are not identical to their parents.<br><br>Asexual reproduction in plants.<br><br>Animals and plants are adapted to suit their environment in different ways which may lead to evolution. |

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| **Substantive Science 9: Biology**<br><br>**Animals**<br> | Make observations and draw pictures of animals and people<br><br>Name main human body parts (head, neck, face, body, legs, arms etc.)<br><br>Understand that humans and animals grow and change over time<br><br>Use senses to explore the world | Identify, name, group, describe and compare common animals<br><br>Identify and name body parts and the senses related to them.<br><br>Understand that humans have offspring that grow into adults<br><br>Describe the basic needs of humans and what they need to make them healthy (exercise, balanced diet) | To identify that humans have skeletons and muscles for support, protection and movement.<br><br>To begin to use classification to help group and name animals.<br><br>To identify that humans have skeletons and muscles of support, protection and movement and identify the different types of teeth found in humans and their different functions. | Living things (plants and animals) are classified into broad groups based on common characteristics.<br><br>To identify and name main parts of the human circulatory system and know the functions of the blood vessels and blood.<br><br>Know how diet, exercise, drugs and lifestyle impact on the way their bodies function.<br><br>Know how nutrients and water are transported in animals and humans.<br><br>Know that living things have changed over time and that fossils provide this information.<br><br>Living things produce offspring of the same kind but these vary and are not identical to their parents.<br><br>Animals and plants are adapted to suit their environment in different ways which may lead to evolution. |

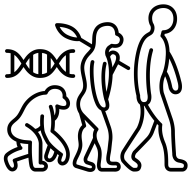
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| **Substantive Science 10: Biology**<br><br>**Living things and their habitats**<br> | Talk about life cycles of plants (sunflowers / beans) and animals (frogs / caterpillars / chicks)<br><br>Know some similarities and differences between the natural world and contrasting environments e.g. weather | Understand that humans have offspring that grow into adults<br><br>Explore what it means to be alive<br><br>Understand how different habitats provide for the needs of different kinds of animals and plants, and how they depend on each other.<br><br>identify and name a variety of plants and animals in their habitats, including microhabitats<br><br>Explore simple food chains | To explore and use classification keys to group and identify living things.<br><br>Recognise that living things can be grouped in a variety of ways.<br><br>Recognise that environments can change which can pose danger to living things.<br><br>Describe in simple terms how fossils are formed when things that have lived are trapped within rock. | Living things (plants and animals) are classified into broad groups based on common characteristics. Give reasons.<br><br>The differences in the life cycles of a mammal, an amphibian, an insect and a bird. The life process of reproduction in some plants and animals.<br><br>The changes as humans develop to old age.<br><br>Living things produce offspring of the same kind but these vary and are not identical to their parents.<br><br>Animals and plants are adapted to suit their environment in different ways which may lead to evolution. |

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| **Substantive Science 11: Biology**<br><br>**Evolution and Inheritance**<br><br> | Explore what families are<br><br>Observe that different animals and plants can be found in different places in the world | Understand that humans have offspring that grow into adults<br><br>Find out what seeds need to grow into mature plants.<br><br>Describe the basic needs of humans<br><br>Describe common animals<br><br>Understand how different habitats provide for the basic needs of different kinds of animals and plants, | Explore the life cycle of flowering plants.<br><br>Recognise that environments can change which can pose danger to living things.<br><br>To identify that humans have skeletons and muscles of support, protection and movement and identify the different types of teeth found in humans and their different functions.<br><br>Describe in simple terms how fossils are formed when things that have lived are trapped within rock. | Know that living things have changed over time and that fossils provide this information.<br><br>Living things produce offspring of the same kind but these vary and are not identical to their parents.<br><br>Animals and plants are adapted to suit their environment in different ways which may lead to evolution. |

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| **Substantive Science 12: Physics**<br><br>Understanding Movement, Magnets and Forces | Explore magnets, ramps, kites and windmills<br><br>Explore sinking and floating during water play | Continue to explore cause and effect in provision | Compare how things move on different surfaces.<br><br>Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance.<br><br>Observe how magnets attract or repel each other and attract some materials and not others.<br><br>Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.<br><br>Describe magnets as having 2 poles. Predict whether 2 magnets will attract or repel each other, depending on which poles are facing. | That gravity causes unsupported objects to fall towards Earth.<br><br>Air resistance, water resistance and friction affect how surfaces move against each other.<br><br>Levers, pulleys and gears allow a smaller force to have a greater effect.<br><br>Compare and group materials based on their response to magnets. |
| **Substantive Science 13: Physics**<br><br>Understanding light and seeing | Use torches, light boxes, mirrors<br><br>Explore colour | Understand that sight is one of the five senses and link to the eyes<br><br>Have an understanding of opaque, transparent and translucent | Recognise that light is required in order to see things and that dark is the absence of light.<br><br>Notice that light is reflected from surfaces.<br><br>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. | Light appears to travel in a straight line and objects give out or reflect light into the eye and that is how we see.<br><br>Shadows have the same shape as the objects that cast them. |

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| **Substantive Science 14: Physics**<br><br>**Investigating sound and hearing** | Play listening games, listen to music<br><br>Explore musical instruments | Listen to music with different rhythm, volume and pitch<br><br>Play percussion instruments<br><br>Identify hearing as one of the five senses and link it to the ears | Identify how sounds are made, associating some of them with something vibrating.<br><br>Understand the link between sound, volume, pitch and vibration.<br><br>find patterns between the pitch of a sound and features of the object that produced it | |
| **Substantive Science 15: Physics**<br><br>**Understanding electrical circuits** | Investigate switches and buttons, cause and effect<br><br>Understand that certain appliances are powered from electricity | Talk about and use technology and understand how it is powered | Identify common appliances that run on electricity.<br><br>Construct a simple series electrical circuit, identifying and naming its basic parts.<br><br>Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.<br><br>Recognise that a switch opens and closes a circuit and its effect.<br><br>Recognise some common conductors and insulators, and associate metals with being good conductors. | The number and voltage of cells used in a circuit affects the brightness of a light or the volume of a buzzer.<br><br>There are variations in how components function. Compare and give reasons for these.<br><br>Recognise symbols in a circuit diagram. |

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| **Substantive Science 16: Physics**<br>**Understanding Earth and its movement in space** | Observe the changing seasons | Observe seasonal changes across the 4 seasons. Observe and describe weather associated with the seasons and how day length varies. | Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.<br><br>Describe in simple terms how fossils are formed when things that have lived are trapped within rock.<br><br>Recognise that soils are made from rocks and organic matter. | The movement of the Earth and other planets are relative to the sun and moon. T<br><br>The sun, Earth and moon are approximately spherical.<br><br>Know how day length is affected by the the rotation of earth.<br><br>That gravity causes unsupported objects to fall towards Earth. |
| **Substantive Science 17: Chemistry**<br>**Understanding Materials and their properties** | Take part in sensory play<br><br>Observe and explore how substances behave and and how they can change<br><br>Use adjectives to talk about what different materials are like | Explore and investigate objects and know what materials they are made from. Describe the properties of common materials. Compare materials based upon their properties.<br><br>Name an increasing number of materials and their properties and discuss their uses. Investigate how the shape of materials can be changed. | Compare and group materials together, according to whether they are solids, liquids or gases.<br><br>Observe that some materials change state state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius.<br><br>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. | Compare and group materials based on their properties (hardness, solubility, transparency, conductivity and response to magnets.<br><br>Give reasons for the usage of different materials based on comparative testing.<br><br>Know that some materials will dissolve in a liquid to form a solution and that substances can be recovered from a solution.<br><br>Solids, liquids and gases can be separated in different ways (filtering, sieving and evaporating).<br><br>Some changes of state are reversible and some are not. |