



Progression Document – Working Scientifically



F1	• Ask questions to find out more • Talk about what they see using a wide vocabulary • Ask Why questions • Choose the right resources to carry out their own plan • Use new vocabulary • Talk about what they see using a wide vocabulary • Compare quantities using language 'more than, fewer than' • Develop their small motor skills so that they can use a range of tools competently, safely and confidently • Make comparisons between objects relating to size, length, weight and capacity • Begin to describe a sequence of events, real or fictional using words such as first • Articulate their ideas and thoughts in sentences
F2	
Year 1	<u>Asking simple questions and recognising that they can be answered in different ways</u> • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered. <u>Observing closely, using simple equipment</u> • Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. • They begin to take measurements, initially by comparisons, then using non-standard units. <u>Performing simple tests</u> • The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time
Year 2	

	<u>Identifying and classifying</u> • Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing. <u>Gathering and recording data to help in answering questions</u> • The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. • They classify using simple prepared tables and sorting rings. <u>Using their observations and ideas to suggest answers to questions</u> • Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources. • The children recognise 'biggest and smallest', 'best and worst' etc. from their data.
Year 3	<u>Asking relevant questions and using different types of scientific enquiries to answer them</u>
Year 4	• The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. • The children answer questions posed by the teacher. • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question. <u>Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</u> • The children make systematic and careful observations. • They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements. <u>Setting up simple practical enquiries, comparative and fair tests</u> • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher.

	• They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. <u>Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</u> • Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams. • Children are supported to present the same data in different ways in order to help with answering the question. <u>Using straightforward scientific evidence to answer questions or to support their findings</u> • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence. <u>Identifying differences, similarities or changes related to simple scientific ideas and processes</u> • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. <u>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</u> • They draw conclusions based on their evidence and current subject knowledge. • They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry. • Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface. • Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry. <u>Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</u> • They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.
Year 5	

Year 6	<u>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</u> • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work. • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample. <u>Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</u> • 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. • 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). <u>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</u> • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question. <u>Identifying scientific evidence that has been used to support or refute ideas or arguments</u> • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer. • They talk about how their scientific ideas change due to new evidence that they have gathered.
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	• They talk about how new discoveries change scientific understanding. <u>Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations</u> • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge. • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data. • They communicate their findings to an audience using relevant scientific language and illustrations. <u>Using test results to make predictions to set up further comparative and fair tests</u> • Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.
Key stage 3	<u>Scientific attitudes</u> ♣ pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility ♣ understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review ♣ evaluate risks. <u>Experimental skills and investigations</u> ♣ ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience ♣ make predictions using scientific knowledge and understanding ♣ select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate ♣ use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety ♣ make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements ♣ apply sampling techniques. <u>Analysis and evaluation</u>

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| | <ul style="list-style-type: none">♣ apply mathematical concepts and calculate results♣ present observations and data using appropriate methods, including tables and graphs♣ interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions♣ present reasoned explanations, including explaining data in relation to predictions and hypotheses♣ evaluate data, showing awareness of potential sources of random and systematic error♣ identify further questions arising from their results. |
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Measurement

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| | <ul style="list-style-type: none">♣ understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature♣ use and derive simple equations and carry out appropriate calculations♣ undertake basic data analysis including simple statistical techniques |
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