




Progression of Working Scientifically Skills at Chaddesley Corbett Primary School




Working scientifically should ALWAYS be taught through and clearly related to substantive science content in the programme of study.


Working Scientifically Skills (Headings taken from the PLAN documents, symbols produced by the PSTT)	Nursery (0-3)	Preschool (3-4)	Reception	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Asking Questions 	<ul style="list-style-type: none"> • Understand simple questions about 'who', 'what' and 'where' (but generally not 'why'). (Communication and language) 	<ul style="list-style-type: none"> • Understand 'why' questions, like: "Why do you think the caterpillar got so fat?" (Communication and language) 	<ul style="list-style-type: none"> • Ask questions to find out more and to check they understand what has been said to them. (Communication and language) 	<ul style="list-style-type: none"> • Can ask simple questions and recognise they can be answered in different ways. - 	<ul style="list-style-type: none"> • Ask relevant questions and use different types of scientific enquiry to answer them. - 	<ul style="list-style-type: none"> • Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
Additional guidance	<ul style="list-style-type: none"> • When talking with young children, give them plenty of processing time (at least 10 seconds). This gives them time to understand what you have said and think of their reply. 	<ul style="list-style-type: none"> • While playing and exploring, the children demonstrate their curiosity. • While playing and exploring, the children begin to ask 'I wonder ...' questions. • With support, the children think of ideas for answering their questions. 	<ul style="list-style-type: none"> • While playing and exploring, the children ask 'I wonder...' questions. • With support, the children develop their ideas for answering their questions 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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.	practical work. They identify the type of enquiry that they have chosen to answer their question	provided to answer the questions using different types of scientific enquiry, helping them to recognise that there are different ways in which questions can be answered.
<p>Making observations and taking measurement</p> 	<ul style="list-style-type: none"> •Explore materials with different properties. •Explore natural materials, indoors and outside. •Explore and respond to different natural phenomena in their setting and on trips. (Understanding the world) •Develop manipulation and control. •Explore different materials and tools. (Physical development) 	<ul style="list-style-type: none"> •Use all their senses in hands-on exploration of natural materials. (Understanding the world) •Explore how things work. (Understanding the world) •Use one-handed tools and equipment. (Physical development) 	<ul style="list-style-type: none"> •Explore the natural world around them. (Understanding the world) •Describe what they see, hear and feel whilst outside. (Understanding the world) •Develop their small motor skills so that they can use a range of tools competently, safely and confidently. (Physical development) •Count objects, actions and sounds. (Mathematics) 	<ul style="list-style-type: none"> •Observe closely using simple equipment 	<ul style="list-style-type: none"> •Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers 	<ul style="list-style-type: none"> •Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
Additional guidance	<ul style="list-style-type: none"> •Provide different types of paper for children to tear, make marks on and print on. •Provide lots of different things for young children to grasp, hold and explore, like clay, finger paint, spoons, brushes, shells. •Provide open-ended play materials inside and outdoors. 	<ul style="list-style-type: none"> •With support, explore the natural and made world using their senses. •With support, the children use magnifying glasses or tablets with magnifiers to make observations. •The children explore using beakers/scoops etc. 	<ul style="list-style-type: none"> •Explore the natural and made world using their senses. •The children use magnifying glasses or tablets with magnifiers to make observations. •The children use smaller pieces of equipment such as syringes and pipettes. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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


	<ul style="list-style-type: none"> • Offer lots of different textures for exploration with fingers, feet and whole body. • Encourage toddlers and young children to enjoy and explore the natural world. • Encourage children's exploration, curiosity, appreciation and respect for living things. • Encourage children to bring natural materials into the setting, such as leaves and conkers. 			<ul style="list-style-type: none"> • They begin to take measurements, initially by comparisons, then using non-standard units. 		<p>observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).</p>
<p>Engage in practical enquiry to answer questions</p> 	<ul style="list-style-type: none"> • Compare sizes, weights etc. using gesture and language - 'bigger/little/smaller', 'high/low', 'tall', 'heavy'. • Compare amounts, saying 'lots', 'more' or 'same' <p>(Mathematics)</p>	<ul style="list-style-type: none"> • Choose the right resources to carry out their own plan. For example, choosing a spade to enlarge a small hole they dug with a trowel. (Physical development) • Select and use activities and resources, with help when needed. This helps them to achieve a goal they have chosen, or one which is suggested to them. (Personal, social and emotional development) • Make comparisons between objects relating to size, length, weight and capacity. (Mathematics) • Compare quantities using language: 'more 	<ul style="list-style-type: none"> • Use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen. (Communication and language) • Show resilience and perseverance in the face of challenge. (Personal, social and emotional development) 	<ul style="list-style-type: none"> • Perform simple tests • Identifying and classifying 	<ul style="list-style-type: none"> • Setting up simple practical enquiries, comparative and fair tests 	<ul style="list-style-type: none"> • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

		<p>than', 'fewer than'. (Mathematics) •Explore collections of materials with similar and/or different properties. (Understanding the world)</p>				
Additional guidance	<ul style="list-style-type: none"> •Use the language of size and weight in everyday contexts. •Provide objects with marked differences in size to play freely with. •Draw attention to changes in amounts. 	<ul style="list-style-type: none"> •Make comparisons between objects ("This leaf is bigger than that one.") and quantities ("There are more flowers on this one."). 	<ul style="list-style-type: none"> •Think out loud how to work things out. •Encourage children to talk about a problem together and come up with ideas for how to solve it. •Give children problem solving words and phrases to use in their explanations: 'so that', 'because', 'I think it's...', 'you could...', 'it might be...' •With support, make comparisons, using hands and feet and other non-standard measures e.g. building blocks and beakers. •While playing and exploring, the children, try out using resources to answer a question 	<ul style="list-style-type: none"> • 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. • 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. 	<ul style="list-style-type: none"> • 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. <p>Explanatory note A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome. A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.</p>	<ul style="list-style-type: none"> • 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.

<p>Recording and presenting evidence</p> 		<p>Talk about what they see, using a wide vocabulary. (Understanding the world)</p>	<p>Connect one idea or action to another using a range of connectives. (Communication and language) Describe events in some detail. (Communication and language)</p>	<ul style="list-style-type: none"> •Gathering and recording data to help in answering questions 	<ul style="list-style-type: none"> •Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions •Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables 	<ul style="list-style-type: none"> •Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
<p>Additional guidance</p>		<ul style="list-style-type: none"> •With support, the children talk about what they have observed. •Encourage children to talk about what they see. •Model observational and investigational skills. Ask out loud: “I wonder if...?” •Plan and introduce new vocabulary, encouraging children to use it to discuss their findings and ideas. •With support, they use sorting rings and boxes. 	<ul style="list-style-type: none"> •The children, sometimes, draw and write simple labels to record their observations. •With support, they record their observations and comparisons e.g. using simple prepared tables, taking photographs, using sorting rings and boxes. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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

					to help with answering the question.	with answering the question.
<p>Answering questions and concluding</p> 		<ul style="list-style-type: none"> •Make comparisons between objects relating to size, length, weight and capacity. (Mathematics) •Compare quantities using language: ‘more than’, ‘fewer than’. (Mathematics) 	<ul style="list-style-type: none"> •Listen to and talk about selected non-fiction to develop a deep familiarity with new knowledge and vocabulary. (Communication and language) •Connect one idea or action to another using a range of connectives. (Communication and language) •Describe events in some detail. (Communication and language) •Compare length, weight and capacity. (Mathematics) 	<ul style="list-style-type: none"> •Using their observations and ideas to suggest answers to questions 	<ul style="list-style-type: none"> •Using straightforward scientific evidence to answer questions or to support their findings •Identifying differences, similarities or changes related to simple scientific ideas and processes •Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions 	<ul style="list-style-type: none"> •Identifying scientific evidence that has been used to support or refute ideas or arguments •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
<p>Additional guidance</p>		<ul style="list-style-type: none"> •With support, the children demonstrate and talk about what they have done and noticed. •With support, the children notice how they made a difference to an outcome, e.g. “My car went further when I pushed it harder.”, and answer the question, where appropriate. •With support, the children make comparisons between objects e.g. “My plant is taller than Sarah’s.”. 	<ul style="list-style-type: none"> •The children talk about what they have observed. •The children demonstrate and talk about what they have found out. •They, sometimes, talk about what they have found out from secondary sources, including non-fiction texts. •The children notice and talk about how they made a difference to an outcome e.g. “My car went further when I pushed it harder.” 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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. • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. 	<ul style="list-style-type: none"> • 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

			<ul style="list-style-type: none"> •The children make direct comparisons or use their recorded observations to communicate what they have found out and answer the question, where appropriate. 		<ul style="list-style-type: none"> • They draw conclusions based on their evidence and current subject knowledge. 	<p>evidence that they have gathered.</p> <ul style="list-style-type: none"> • They talk about how new discoveries change scientific understanding. • 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.
<p>Evaluating and creating further questions and predictions</p> 					<ul style="list-style-type: none"> •Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions 	<ul style="list-style-type: none"> •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 •Using test results to make predictions to set up further comparative and fair tests
<p>Additional guidance</p>					<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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.

					<p>values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.</p> <ul style="list-style-type: none"> • Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry. 	<ul style="list-style-type: none"> • They identify any limitations that reduce the trust they have in their data. • Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.
<p>Communicating their findings</p> 					<p>Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p>	<p>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</p>
<p>Additional guidance</p>					<ul style="list-style-type: none"> • They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary. 	<ul style="list-style-type: none"> • They communicate their findings to an audience using relevant scientific language and illustrations.

Enquiry types (designed by the PSTT) used:

Comparative / fair testing

Changing one variable to see its effect on another, whilst keeping all others the same.



Research

Using secondary sources of information to answer scientific questions.



Observation over time

Observing changes that occur over a period of time ranging from minutes to months.



Pattern-seeking

Identifying patterns and looking for relationships in enquiries where variables are difficult to control.



Identifying, grouping and classifying

Making observations to name, sort and organise items.

