Progression: Working Scientifically.

Progression of Science: Asking questions and recognising that they can be answered in different ways

<table>
<tr><th>KS1</th><th>KNOWLEDGE</th><th>PERFORMANCE OF SKILLS</th></tr>
<tr><td rowspan="2"></td><td>Prior knowledge:
In EYFS:
Communication and Language Goals.
- Offer explanations of why things happen.
- Ask questions to clarify understanding.</td><td rowspan="2">All children (WTS)
- In the world around them, children recognise objects with certain characteristics and begin to compare them. Children begin to ask questions about the way things work and explore to find the answer.
- With support, can answer questions developed by their teacher. ‘Which is the stretchiest?’

Most children (EXS)
- Form questions about the function of characteristics of the world around them and form answers to these questions.
- Plan how to answer a question and which resources to use, we will use the scales to find the heaviest item.

Some children (GDS)</td></tr>
<tr><td>Asking simple questions and recognising that they can be answered in different ways

• While exploring the world, 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.

• Children answer questions developed with the teacher often through a scenario.

• 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.</td></tr>
<tr><td>LKS2</td><td>Prior knowledge:
KS1
• 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.</td><td>All children (WTS)
• Children apply their scientific learning to questions posed by their teacher.
Most children (EXS)
• Children use their scientific knowledge to answer questions, both independently generated and posed by their teacher.</td></tr>
</table>

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<table>
<tr><td></td><td>Asking relevant questions and using different types of scientific enquiries to answer them
Children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions.
Children answer questions posed by the teacher.
Given a range of resources, 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.</td><td>Choose equipment independently and explain how it will help them answer their enquiry.
Can identify the type of enquiry that they have chosen to answer their question.
Some children (GDS)</td></tr>
<tr><td rowspan="2">UKS2</td><td>Prior knowledge:
LKS2:
Given a range of resources, 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.</td><td rowspan="2">All children (WTS)
Ask questions generated by their learning.
Can choose appropriate equipment when given a range to choose from.
Know that researching a topic can help us to answer questions.
Most children (EXS)
Children generated questions about their scientific experiences. These are usually based on deepening understanding or further investigations.
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.
Apply research to questions where practical work cannot be carried out.
Some children (GDS)</td></tr>
<tr><td>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
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 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.</td></tr>
</table>

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Progression of Science: Observe and measure results.

<table>
<tr><th></th><th>KNOWLEDGE</th><th>PERFORMANCE OF SKILLS</th></tr>
<tr><td rowspan="2">KS1</td><td>Prior knowledge:
ELG: Self-confidence and self-awareness.
- Choose the resources they need for their chosen activities.</td><td rowspan="2">All children (WTS)
• Given equipment, use these to observe the world around them. (Magnifying glasses, listening phones).
• Use objects to take measurements.

Most children (EXS)
• Children use equipment to enhance their experience of the world around them.
• Use equipment to take standard and non-standard measurements.

Some children (GDS)</td></tr>
<tr><td>Observing closely, using simple equipment
• 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.
• Children begin to take measurements, initially by comparisons, then using non-standard units.</td></tr>
<tr><td rowspan="2">LKS2</td><td>Prior knowledge:
KS1
• Children begin to take measurements, initially by comparisons, then using non-standard units.</td><td rowspan="2">All children (WTS)
• Take measurements using criteria. ‘Measure the length every 30 minutes.’

Most children (EXS)
• Make measurements and observe using a set of criteria. Timed/after events.
• Use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.

Some children (GDS)</td></tr>
<tr><td>Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
• Children make systematic and careful observations.
• Children use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.</td></tr>
</table>

Progression: Working Scientifically.

<table>
<tr><td rowspan="2">UKS2</td><td>Prior knowledge:
LKS2
• Children make systematic and careful observations.
• Children use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.</td><td rowspan="2">All children (WTS)
• Given a range of options can choose the most effective equipment to measure with.
• With support, make decisions around the quality of the data they collect.
Most children (EXS)
• Select appropriate measuring equipment in terms of scale and justify their choices.
• Reason that the measurements they take during inquiry need to be valid and make choices which ensure this.

Some children (GDS)</td></tr>
<tr><td>Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
• 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, children 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).</td></tr>
</table>

Progression of Science: Record and presenting evidence.

KS1	**KNOWLEDGE**	**PERFORMANCE OF SKILLS**
	Prior knowledge:	**All children (WTS)** • With support, record their observations. • As part of a guided group, begin to record measurements and sort objects into predetermined categories. **Most children (EXS)**

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<table>
<tr><td></td><td>Gathering and recording data to help in answering questions
Children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing.
Children record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs.
Children classify using simple prepared tables and sorting rings.</td><td>Children record their observations in a variety of ways and label measurements.
Using pre-prepared resources, children record the measurements taken.
Using pre-determined groups, children sort objects and materials.
Some children (GDS)</td></tr>
<tr><td rowspan="2">LKS2</td><td>Prior knowledge:
Children record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs.
Children classify using simple prepared tables and sorting rings.</td><td rowspan="2">All children (WTS)
Know that data can be presented in a range of different ways and use these to record with support.
Know that representing data can help to answer questions and with support draw simple conclusions.
Most children (EXS)
Understand a growing range of ways in which data can be represented and begin to choose which of these might be useful when presenting their data.
Present the same data in a range of ways with support and begin to describe the ways which make the results of their enquiry clearer.
Some children (GDS)</td></tr>
<tr><td>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
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.</td></tr>
<tr><td rowspan="2">UKS2</td><td>Prior knowledge:</td><td rowspan="2">All children (WTS)
Given a wider range of options to display data, can discuss the pros and cons of each.
Chooses appropriate headings when classifying but may need support to choose the best method of recording.
Most children (EXS)
Decide on how they will present their measurements from a wide-range of options and are able to justify their choices.</td></tr>
<tr><td>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
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</td></tr>
</table>

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	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.	• Classify objects using methods/categories of their own design. • Independently produce the same data across a range of ways to answer an enquiry question. **Some children (GDS)**

Progression of Science: Answering questions and concluding.

KS1	**KNOWLEDGE**	**PERFORMANCE OF SKILLS**
	Prior knowledge:	**All children (WTS)** • With support, take a range of approaches to answer questions. Observing, measuring or researching. • With support, label the extremes of their data. (Best/worst, longest/shortest) **Most children (EXS)** • Take a range of approaches to answer questions. Observing, measuring or researching. • Identify the extremes of their data. (Best/worst, longest/shortest) **Some children (GDS)**
	Using their observations and ideas to suggest answers to questions • 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. ***Using their observations and ideas to suggest answers to questions*** • Children recognise 'biggest and smallest', 'best and worst' etc. from their data.	
LKS2	**Prior knowledge:** • 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.	**All children (WTS)** • With support, can relate their observations, measurements and research to questions posed and use it to answer accurately. • With support, children use their data to make comparative statements from across the range of their measurements.

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- Children recognise 'biggest and smallest', 'best and worst' etc. from their data.

</td><td>'The tights stretch longer than the toilet paper'.

Most children (EXS)</td></tr>
<tr><td></td><td>Using straightforward scientific evidence to answer questions or to support their findings.
• 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.
Identifying differences, similarities or changes related to simple scientific ideas and processes
• Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships.</td><td>• Relate their observations, measurements and research to questions posed and use it to answer accurately.
• Children use their data to make comparative statements from across the range of their measurements and begin to explain causal relationships. 'The egg shell in the water lasted longer than the one in the cola because it has less sugar'.

Some children (GDS)</td></tr>
<tr><td>UKS2</td><td>Prior knowledge:
• 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.</td><td>All children (WTS)
• Can draw on observations, measurements and research to answer an enquiry question.
• With support, can discuss how the results of their findings have changed their scientific thinking.
• Begin to make connections between research and altering scientific understanding.
• Begin to explain the relationships between their research including, with support, identifying measurements which do not fit their results.</td></tr>
<tr><td></td><td>Identifying scientific evidence that has been used to support or refute ideas or arguments
• 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.
• Children talk about how their scientific ideas change due to new evidence that they have gathered.
• Children talk about how new discoveries change scientific understanding.</td><td>Most children (EXS)
• Can explain how their observations, measurements and research supports or not does support scientific understanding.
• Discuss how the results they have collected have changed their own scientific thinking.
• Explain how investigations can change understanding within the scientific community.
• Identify the relationships between factors in their conclusion – the water at higher temperature caused the sugar to melt and sped up the process of dissolving.</td></tr>
</table>

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	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 • 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.	• Can identify measurements which do not fit their findings and begin to find reasons for this. **Some children (GDS)**

Progression of Science: Evaluating enquiries.

LKS2	**KNOWLEDGE**	**PERFORMANCE OF SKILLS**
	Prior knowledge:	**All children (WTS)** • Can conclude whether their experiment successfully answered their enquiry question. • Can explain how they changed their experiment. • Can explain how they might change their experiment in the future. **Most children (EXS)** • Give reasons why their experiment has been successful/unsuccessful. • Can give reasons why they have changed their methodology and reflect further changes required. **Some children (GDS)**
	Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • Children identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.	
UKS2	**Prior knowledge:** • Children identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.	**All children (WTS)** • Evaluate their enquiry, beginning to show understand that a successful investigation needs to have accurate methodology, controlled variable and accurate measurements. • With support, can explain the reasons their data may be flawed. (Sometimes it took a while to find my pulse before I took the reading.) **Most children (EXS)** • Understand that variables should be controlled, measured and changed accurately and that this is key to a successful
	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 • Children evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements	

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	and the credibility of secondary sources used. • Children identify any limitations that reduce the trust they have in their data.	investigation along with accurate results and a concise methodology and use this to evaluate their work. • Explain how limitations/flaws in their results could be mitigated in future investigations. **Some children (GDS)**