



Mapping progression across Key Stage 1 and Key Stage 2

Sc1: Working Scientifically

Scientific Enquiry describes the processes and skills pupils should be taught and use, to find out more about the world and how it works. ... - Turner et al, takes the view that: '**Science enquiry** is what children do in order to answer **scientific** questions about the world around them'

Scientific enquiry increases children's capacity to:

- Problem solve and answer questions. Rich opportunities are provided where children explore their own ideas, develop and deepen conceptual understanding.
- Work with independence. Thinking and reasoning is nurtured alongside a host of qualities, including resilience, determination and confidence.
- 'Be a scientist'. A necessary toolkit of practical skills is developed and added to over time.
- Communicate effectively. Technical and scientific vocabulary is learned, practised and used, as children communicate evidence in a variety of ways, often with different audiences in mind.

Observing changes over time – observations or measurements are made at regular intervals

Making **careful** observations of objects or events and how they change over time.

- Long term studies of how plants and habitats change through the year
- Taking observations of ice melting
- Measuring pulse rate after exercise
- Noticing how shadows change throughout the day
- Noticing how the moon changes shape during the month
- Observing how mould grows on different foods
- Taking observations of a puddle on a hot day

Comparative and fair test – exploring cause and effect

Observing or measuring the effect of **changing one variable** whilst keeping other potential variables the same.

- Investigating how shadows change size
- Investigating air resistance using parachutes
- Investigating dissolving rates
- Investigating properties of materials

Classifying – sorting and grouping according to similarities and differences

Identify features that allow things to be organised into distinct groups.

- Classifying rocks, plants and animals
- Classifying living, not living, never been alive
- Classifying materials including those that can be recycled
- Using keys to identify plants and animals

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<p>Recognise things as part of a specific group and name them.</p>	
<p>Researching – using secondary sources to find answers to questions</p> <p>Gathering and analysing scientific finding to answer a question or to provide background information to help explain observed events.</p> <p>Research can also show how scientists’ ideas have changed over time as new evidence has been found.</p>	<ul style="list-style-type: none"> • Using keys to identify plants and animals • Learning what animals eat • Learning about the digestive system, circulatory system, planets • Learning about phases of the moon
<p>Modelling</p>	<ul style="list-style-type: none"> • Concrete models e.g. of the digestive system, movement of earth and Moon, circulatory system

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To be able to work independently pupils need to develop a set of skills that they can then use whilst carrying out different types of enquiry. They need to be able to:					
<ul style="list-style-type: none"> · Ask questions · Make predictions · Decide how to carry out an enquiry · Take measurements · Record data 		<ul style="list-style-type: none"> · Present data · Answer questions using data · Draw conclusions · Evaluate their enquiry 			
KS1		Lower KS2		Upper KS2	
During Years 1 & 2 , pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:		During Years 3 & 4 , pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:		During Years 5 & 6 , pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:	
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Asking Questions					
<ul style="list-style-type: none"> • To ask simple questions and recognise that they can be answered in different ways • To test ideas suggested to them and say what they think will happen 	<ul style="list-style-type: none"> • To suggest some ideas and questions based on simple knowledge 	<ul style="list-style-type: none"> • In a variety of contexts, to suggest questions and ideas and how to test them. 	<ul style="list-style-type: none"> • To suggest relevant questions based on scientific knowledge that can be tested and suggest how to test those using different types of scientific enquiry. 	<ul style="list-style-type: none"> • With support begin to ask questions and develop a line of enquiry based on observations of the real world 	<ul style="list-style-type: none"> • To ask questions and develop a line of enquiry based on observations of the real world • To know how to turn a question or idea into a form that can be tested.
Examples					
<ul style="list-style-type: none"> • I can ask a few simple questions 	<ul style="list-style-type: none"> • I can ask simple questions about 	<ul style="list-style-type: none"> • I can ask some relevant questions about 	<ul style="list-style-type: none"> • I can ask some relevant questions about 	<ul style="list-style-type: none"> • I am beginning to explore ideas and ask my own 	<ul style="list-style-type: none"> • I can explore ideas and ask my own questions

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about the world around us	the world around us	the world around us <ul style="list-style-type: none"> I can use some different types of scientific enquiry to answer questions 	the world around us <ul style="list-style-type: none"> I can use some different types of scientific enquiry to answer questions 	questions about scientific phenomena	about scientific phenomena
Making Predictions					
<ul style="list-style-type: none"> To say what they think might happen with support. 	<ul style="list-style-type: none"> To say what they think might happen. 	<ul style="list-style-type: none"> To make predictions about what will happen. 	<ul style="list-style-type: none"> To make predictions about what will happen, some of which are based on scientific knowledge. 	<ul style="list-style-type: none"> To make predictions of what will happen based on scientific knowledge and understanding 	<ul style="list-style-type: none"> To make predictions using scientific knowledge and understanding
Examples					
Deciding how to carry out an enquiry or investigation					
<ul style="list-style-type: none"> To say how they might find out about ideas and questions that they suggest with support. To think about and discuss whether comparisons and tests are fair or unfair with support. 	<ul style="list-style-type: none"> To say how they might find out about ideas and questions that they suggest. To think about and discuss whether comparisons and tests are fair or unfair. 	<ul style="list-style-type: none"> To consider what makes a fair test unfair or evidence sufficient and with help, plan a fair test. To think about how to collect sufficient evidence. 	<ul style="list-style-type: none"> To design a fair test. To plan how to collect sufficient evidence. To think about why observations and measurements should be repeated. To choose what apparatus to use 	<ul style="list-style-type: none"> To plan a fair test using previous knowledge and understanding. To identify factors that need to be taken into consideration in different contexts. To collect sufficient 	<ul style="list-style-type: none"> To decide how to turn ideas into a form that can be tested. To identify factors that are relevant to a particular situation. To choose what evidence to collect to investigate a

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			and what to measure (in some contexts)	evidence to test an idea.	question, ensuring the evidence is sufficient. <ul style="list-style-type: none"> • To choose what equipment to use.
Examples					
<ul style="list-style-type: none"> • I can begin to use some different types of enquiry to answer questions 	<ul style="list-style-type: none"> • I can begin to use different types of enquiry to answer questions 	<ul style="list-style-type: none"> • I am beginning to decide which types of enquiry is best to answer my question • I can set up some simple practical enquiries, including comparative and fair tests • I am beginning to help decide which variables to keep the same and which to change 	<ul style="list-style-type: none"> • I can use some different types of scientific enquiry to answer questions • I am beginning to decide which types of enquiry is best to answer my question • I can set up simple practical enquiries, including comparative and fair tests • I am beginning to help decide which variables to keep the same and which to change 	<ul style="list-style-type: none"> • I am beginning to plan different types of scientific enquiry to answer questions • I can sometimes set up a range of comparative and fair tests • I am beginning to explain which variables need to be controlled and why 	<ul style="list-style-type: none"> • I can plan different types of scientific enquiry to answer questions • I can set up a range of fair tests • I can explain which variables need to be controlled and why
Making Measurements					

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<ul style="list-style-type: none"> • To perform simple tests. • To observe closely, using appropriate senses and simple equipment. • To collect evidence to try to answer a question. • To make some measurements of length using standard and non-standard measures. 	<ul style="list-style-type: none"> • To perform simple tests. • To collect evidence to try to answer a question. • To observe closely, using appropriate senses and simple equipment. • To make measurements of length and height in standard and non-standard measure. 	<ul style="list-style-type: none"> • To gather and record evidence in a variety of context to answer a question or test an idea. • To make systematic and careful observations and comparisons. • To take accurate measurements of length, volume of liquid and time using standard units of measure and measuring equipment, effectively. • To use a range of equipment, including thermometers and data loggers. 	<ul style="list-style-type: none"> • To gather and record evidence in a variety of contexts to test an idea or prediction based on their scientific knowledge and understanding. • To make systematic observations and comparisons of relevant features in a variety of contexts. • To take accurate measurements of temperature, time and force, as well as measurements of length using standard units of measure and measuring equipment, effectively. • To use a range of equipment, including thermometers and data loggers. 	<ul style="list-style-type: none"> • To take measurements using a range of scientific equipment, with increasing accuracy and precision. • To make relevant observations. • To consolidate measurement of volume, temperature, time, length and force (using Newton meters) • To think about why observations and measurements should be repeated and take repeat readings when appropriate. • To solve problems involving the calculation and conversion of units of measure, using decimal 	<ul style="list-style-type: none"> • To make a variety of relevant observations and measurements using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate. • To decide when observations and measurements need to be checked, by repeating, to give more reliable data. • To measure pulse. • To solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where
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				<p>notation up to three decimal places where appropriate (Maths)</p> <ul style="list-style-type: none"> To consider how scientists have combined evidence from observation and measurement with creative thinking to suggest new ideas and explanations for phenomena. 	<p>appropriate (Maths)</p> <ul style="list-style-type: none"> To consider how scientists have combined evidence from observation and measurement with creative thinking to suggest new ideas and explanations for phenomena.
Examples					
<ul style="list-style-type: none"> I can begin to perform simple tests 	<ul style="list-style-type: none"> I can perform simple tests I can observe changes over time I can say what I am looking for and what I am measuring I can measure with non-standard units and can begin to use simple standard units eg, 	<ul style="list-style-type: none"> I can make systematic and careful observations I can decide what to observe and how long to collect observations I can take accurate measurements using standard units eg mm, cm, 	<ul style="list-style-type: none"> I can make systematic and careful observations I can decide what to observe and how long to collect observations I can take accurate measurements using standard units eg mm, cm, 	<ul style="list-style-type: none"> I can make accurate and precise measurements I can decide what to observe, how long to observe for and whether to repeat them I can take accurate and precise measurements using standard units N, g, kg, 	<ul style="list-style-type: none"> I can make accurate and precise measurements I can decide what to observe, how long to observe for and whether to repeat them I can take accurate and precise measurements using standard units N, g, kg,

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	mm, cm, m, ml, l, °C <ul style="list-style-type: none"> I can use simple equipment eg hand lenses, egg timers I am beginning to notice patterns 	m, ml, l, °C, seconds, minutes <ul style="list-style-type: none"> I can decide which equipment to use and can use new equipment eg. data loggers I can look for patterns and relationships 	m, ml, l, °C, seconds, minutes <ul style="list-style-type: none"> I can decide which equipment to use and can use new equipment eg. data loggers I can look for patterns and relationships 	mm, cm, mins, seconds, cm ² , V, km/h, m per sec, m/sec <ul style="list-style-type: none"> I can select equipment on my own and can explain how to use it accurately 	mm, cm, mins, seconds, cm ² , V, km/h, m per sec, m/sec <ul style="list-style-type: none"> I can select equipment on my own and can explain how to use it accurately
Recording & Presenting Data					
<ul style="list-style-type: none"> To present some findings in simple tables and block graphs using ICT where relevant. 	<ul style="list-style-type: none"> To make records of observations To present results in tables, drawings, block graphs using ICT where relevant. 	<ul style="list-style-type: none"> To gather, record, classify and present data in a variety of ways to help in answering questions. To record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables using ICT where relevant. To report on findings from enquiries, including oral and 	<ul style="list-style-type: none"> To gather, record, classify and present data in a variety of ways to help in answering questions. To record findings using simple scientific language, drawings, labelled diagrams, classification keys, bar charts and tables using ICT where relevant. To report on findings from 	<ul style="list-style-type: none"> To record data and results of increasing complexity using scientific diagrams and labels, tables and bar charts and line graphs using ICT where relevant. To report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in 	<ul style="list-style-type: none"> To record data and results of increasing complexity using classification keys, tables, pie charts, bar charts and line graphs to present results using ICT where relevant. To report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in

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		written explanations, displays or presentations of results and conclusions.	enquiries, including oral and written explanations, displays or presentations of results and conclusions.	oral and written forms.	oral and written forms.
Examples					
<ul style="list-style-type: none"> I can begin to collect simple data I can begin to record data in a table my teacher has provided I can begin to communicate my findings in a variety of ways 	<ul style="list-style-type: none"> I can collect simple data I can record data in a table my teacher has provided I can communicate my findings in a variety of ways 	<ul style="list-style-type: none"> I am beginning to collect data in a variety of ways, including labelled diagrams, bar charts and tables I am beginning to help decide how to record data 	<ul style="list-style-type: none"> I can collect data in a variety of ways, including labelled diagrams, bar charts and tables I can help decide how to record data 	<ul style="list-style-type: none"> I am beginning to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar graphs, line graphs I am beginning to choose how best to present data 	<ul style="list-style-type: none"> I can record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar graphs, line graphs I can choose how best to present data
Answering Questions using Data					
<ul style="list-style-type: none"> To make simple comparisons and groupings that relate to differences and similarities 	<ul style="list-style-type: none"> To make simple comparisons, identifying similarities and differences between living 	<ul style="list-style-type: none"> To make generalisations and begin to identify simple patterns in 	<ul style="list-style-type: none"> To identify simple trends and patterns in results presented in tables, charts and graphs and 	<ul style="list-style-type: none"> To decide whether results support any prediction. 	<ul style="list-style-type: none"> To make comparisons. To evaluate repeated results. Patterns in results

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<p>between living things and objects.</p> <ul style="list-style-type: none"> To say what their observations show, and whether it was what they expected 	<p>things, objects and events.</p> <ul style="list-style-type: none"> To say what results will show. To say whether their predictions were supported. 	<p>results presented in tables.</p> <ul style="list-style-type: none"> To identify differences, similarities or changes related to simple scientific ideas and processes. 	<p>to suggest explanations for some of these.</p> <ul style="list-style-type: none"> To identify differences, similarities or changes related to simple scientific ideas and processes. 	<ul style="list-style-type: none"> To begin to evaluate repeated results. To recognise and make predictions from patterns in data and suggest explanations for these using scientific knowledge and understanding. To interpret data and think about whether it is sufficient to draw conclusions. To identify scientific evidence that has been used to support or refute ideas or arguments. 	<ul style="list-style-type: none"> To identify patterns in results that do not appear to fit the pattern. To identify scientific evidence that has been used to support or refute ideas or arguments.
<p>Examples</p>					
<ul style="list-style-type: none"> I can begin to communicate my findings in a variety of ways 	<ul style="list-style-type: none"> I can communicate my findings in a variety of ways 	<ul style="list-style-type: none"> I am beginning to communicate findings using simple scientific language 	<ul style="list-style-type: none"> I can communicate findings using simple scientific language 	<ul style="list-style-type: none"> I am beginning to communicate findings using detailed scientific language 	<ul style="list-style-type: none"> I can communicate findings using detailed scientific language
<p>Drawing Conclusions</p>					

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<ul style="list-style-type: none"> To draw simple conclusions and explain what they did. 	<ul style="list-style-type: none"> To use knowledge to explain what was found out and to draw conclusions. 	<ul style="list-style-type: none"> To draw simple conclusions from results and begin to use scientific knowledge and evidence to answer questions or to suggest explanations for them and to support their findings. To make predictions for new values. 	<ul style="list-style-type: none"> To explain what the evidence shows by drawing simple conclusions and begin to use scientific knowledge and evidence to say whether it supports any prediction made. To link the evidence to scientific knowledge and understanding in some contexts. To make predictions for new values. 	<ul style="list-style-type: none"> To draw conclusions indicating whether these match any prediction made. 	<ul style="list-style-type: none"> To use results to draw conclusions and to make further predictions. To say whether the evidence supports any prediction made.
<p>Examples</p>					
<ul style="list-style-type: none"> I can begin to talk about what I have found out I can begin to explain how I carried out my enquiry 	<ul style="list-style-type: none"> I can talk about what I have found out I can explain how I carried out my enquiry 	<ul style="list-style-type: none"> I am beginning to draw simple conclusions based on the results of my enquiry I am beginning to answer my questions using the results of my enquiry 	<ul style="list-style-type: none"> I can draw simple conclusions based on the results of my enquiry I can answer my questions using the results of my enquiry 	<ul style="list-style-type: none"> I am beginning to draw scientific, casual conclusions using the results of an enquiry to justify my ideas I am beginning to explain my conclusion using scientific 	<ul style="list-style-type: none"> I can draw scientific, casual conclusions using the results of an enquiry to justify my ideas I can explain my conclusion using scientific knowledge and understanding

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				knowledge and understanding • I am beginning to distinguish opinion and fact	• I can distinguish opinion and fact
Evaluating the Enquiry or Investigation					
• To explain what they did with support.	• To explain what they did.	• To explain and reflect on the investigation and say how to improve, with support.	• To explain and reflect on the investigation and say how to improve.	• To suggest and evaluate explanations for these predictions using scientific knowledge and understanding, with support.	• To suggest and evaluate explanations for these predictions using scientific knowledge and understanding.
Examples					
• I can begin to suggest some simple changes to my enquiry	• I can suggest simple changes to my enquiry	• I am beginning to use my findings to make new predictions, suggest improvements and think of new questions • I am beginning sometimes, to think of cause and effect in my explanations	• I can use my findings to make new predictions, suggest improvements and think of new questions • I can begin to think of cause and effect in my explanations	• I am beginning to use my findings to suggest improvements to my test, giving reasons, make predictions and set up further enquiries • I can begin to use abstract models to explain my ideas	• I can use my findings to suggest improvements to my test, giving reasons, make predictions and set up further enquiries • I can begin to use abstract models to explain my ideas