	Upper KS2 Years 5 & 6 ***'The Maturing Scientist'***	*Uni-structural: the Pupil's response focuses on one relevant aspect.* 	*Multi-structural: the Pupil's responses focuses on several relevant aspects* 	*Relational: The different aspects have become integrated into a coherent whole* 	*Extended Abstract: The whole may be conceptualised at a higher level and generalised to a new topic or area.* 
	Working Scientifically Skills	**Emerging**	**Developing**	**Secure**	**Exceeding**
Planning	**Asking questions and recognising that they can be answered in different ways** • Planning different types of scientific enquiries to answer questions. *Test types:* ➢ *identifying and classifying* ➢ *observing over time* ➢ *fair testing* ➢ *pattern seeking* ➢ *researching using secondary sources*	**Ask** their own scientific questions based on prior knowledge and learning. **List** possible resources and **discuss** with others how to gather evidence to answer a scientific question**.**	**Suggest** their own scientific questions using their own prior knowledge or based on a previously taught scientific enquiry. **Identify** the type of enquiry to answer their own questions and **explain** their choice. **Choose** from a range of resources and **decide** in discussion with others how to gather evidence to answer a scientific question**.** **Recognise** when secondary sources can be used to answer questions that cannot be answered through practical work.	**Generate** their own scientific questions to **ask**. This may be stimulated by a scientific experience or **asking** further questions based on their developed understanding following an enquiry. **Choose** an enquiry type to carry out and justify their choice. **Select** from a wide range of resources and **decide** how to gather evidence to answer a scientific question independently. **Recognise** how secondary sources can be used to answer questions that cannot be answered through practical work.	**Theorise** questions to ask that are developed from their own scientific knowledge and linked to a scientific experience or leading on from an enquiry already made. **Create** a suitable enquiry by **selecting** an appropriate enquiry type to carry out in response to a question asked. **Reflect** on when and how secondary sources can be used to answer questions that cannot be answered through practical work.
	Engaging in practical enquiry to answer questions • Recognising and controlling variables where necessary.	**Follow** plans to carry out fair tests, through group discussion **identify** variables and discuss how to **control** them. **Select** from a given range of practical resources. **Gather** evidence to answer their own questions.	Carry out fair tests, **recognise** variables and **suggest** how to **control** them. **Select** appropriate practical resources to gather evidence. **Discuss** how to gather evidence to answer their own questions. **Explain** patterns and relationships.	Carry out fair tests, **recognise** and **control** variables. **Select** from a range of practical resources to gather evidence to answer their questions. **Decide** what observations or measurements to make over time and for how long. **Examine** for patterns and relationships using a suitable sample.	**Predict** when variables may need to be controlled during fair tests ahead of carrying them out. **Evaluate** the effectiveness of practical resources when selecting to support the gathering of evidence through observations and measurements. **Analyse** for patterns and relationships using a suitable sample and **theorise** what future patterns might be.
Obtaining and Presenting	**Making observations and taking measurements** • Taking measurements, using a range of scientific equipment.	**Select** and **use** a range of different equipment to take measurements. **Describe** simple observations by making	**Apply** knowledge of how to use a range of equipment for taking accurate measurements of: length, time, temperature and capacity using standard units of measurement. *E.g using thermometers and data loggers.*	**Select** measuring equipment to give the most precise results. *E.g. ruler, tape measure or trundle wheel, force meter with a suitable scale.*	**Reflect** on why certain measuring equipment is chosen to give **accurate** results. **Hypothesise** when repeat readings might need to be made in order to get

	• With increasing accuracy and precision, taking repeat readings when appropriate.	**comparisons** and noticing changes.	**Gather** systematic and careful observations to **explain** outcomes, **discuss** when decisions need to be made about what to do next.	During an enquiry, **recognise** when any decisions need to be made and **identify** what needs to happen next. *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).*	accurate data during an enquiry and **identify** what needs to happen next.
	Recording and presenting evidence • Recording data and results of increasing complexity. • Using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs to present.	**Use** a given format to **record** and **present** observations and evidence in response to answering a question. **Recording** measurements and classifications using suggested examples. *E.g using tables, tally charts, bar charts, Venn diagrams, Carroll diagrams. (given templates, if required, to which they can add headings).*	**Discuss** and sometimes **decide** how to **record** and **present** observations and evidence. *E.g using photographs, videos, pictures, labelled diagrams or writing.* **Record** measurements with guidance *E.g using tables, tally charts and bar charts* **Record** classifications with guidance *E.g using tables, Venn diagrams, Carroll diagrams.* **Present** data in different ways to help answering the question with some support given.	**Decide** how to record and present evidence. **Gather and record** observations *E.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing.* **Record** measurements confidently *E.g. using tables, tally charts, bar charts, line graphs and scatter graphs.* **Record** classifications confidently *E.g. using tables, Venn diagrams, Carroll diagrams and classification keys.* **Present** the same data in different ways in order to help with answering the question.	**Evaluate** and **use** a variety of ways to record and present evidence that is increasing in complexity. **Assemble** and **record** observations, measurements and classifications in different ways in order to help in answering the question.
	Communicating their findings • Reporting and presenting findings from enquiries. • Including: conclusions, casual relationships and explanations of and degree of trust in results. • In oral and written forms such as displays and other presentations.	**Describe** findings using scientific vocabulary orally and in writing. **Sequence** and **present** results by communicating findings in writing and **identify** patterns in results.	**Explain** findings using the appropriate scientific vocabulary communicating to an audience both orally and in writing. **Communicate** and **explain** findings from enquiries by sequencing and presenting evidence in a logical way. *E.g.* ***comment*** *on relationships and patterns alongside subject knowledge.*	**Evaluate** findings by communicating to an audience using relevant scientific language and illustrations. **Conclude** and **answer**: **identify** casual 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.	**Summarise** findings by communicating to an audience using relevant scientific language and illustrations. **Elaborate** on their evidence of patterns in the natural world, **compare** the results that do not fit the overall pattern and **justify** their findings using their subject knowledge.
Considering evidence and Evaluating	**Answering questions and concluding** • Identifying scientific evidence that has been used to support or refute ideas or arguments.	**Explain** answers to their own questions using scientific evidence they have found that supports their answers. **Compare** evidence gathered by **suggesting** similarities and differences in the data. **Describe** how some prior knowledge **combined** with data and observations may have changed scientific understanding.	**Answer** their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. **Explain** how the evidence gathered from a number of sources supports their answers. Also **conclude** by also explaining why they might not. **Interpret** data to **generate** simple comparative statements based on the evidence they have gathered.	**Answer** and **analyse** their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. **Discuss** and **justify** whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer. **Summarise,** talking about how their scientific ideas change due to new evidence that they have gathered. **Explain** how new discoveries change scientific understanding.	**Evaluate** their own and others' questions with the evidence presented from a variety of sources to make conclusions. **Consider** whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer. **Reflect** and **summarise** how their scientific ideas and understanding have changed due to new evidence gathered and discoveries made.

	Evaluating and raising further questions and predictions • Using test results to make predictions to set up further comparative and fair tests. • Including: conclusions, casual relationships and explanations of and degree of trust in results.	**Provide** answers to the enquiry question using the results gathered. **Explain** conclusions based on the evidence and current subject knowledge. **Ask** further questions due of their enquiry findings.	**Use** scientific experience gained to **formulate** further questions which can be answered by using comparative and fair tests. **Explain** ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry. **Compare** similarities and differences in results which may reduce the degree of trust in data.	**Relate** the scientific knowledge gained from enquiry work to make **predictions** that they can investigate using comparative and fair tests. **Evaluate**, the choice of method used, the control of variables, the precision and accuracy of measurements and credibility of secondary sources used. **Identify** any limitations that reduced the trust in their data.	**Hypothesise** using scientific understanding from enquiry work to further investigate using comparative and fair tests. **Summarise** the effectiveness of the choice of method used. **Justify** the control of variables and the accuracy of measurements. **Judge** the credibility of secondary sources used. **Reflect** on the data gathered and draw conclusions about whether the results can be trusted.

SOLO Taxonomy

Biggs and Collis 1982

Define
Identify
Do simple procedure

Define
Describe
List
Do algorithm
Combine

Formulate questions
Compare/contrast
Explain causes
Sequence
Classify
Analyse -part/whole
Relate
Analogy
Apply

Evaluate
Theorise
Generalise
Predict
Create
Imagine
Hypothesise
Reflect