focuses on one relevant aspects whole conceptualised at level and general new topic or	e may be a higher
focuses on one relevant aspects whole conceptualised at level and general new topic or	a higher
relevant aspect. level and general new topic or	_
new topic or	ised to a
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	C3
'The Maturing Scientist'	
Working Scientifically Skills Emerging Developing Secure Exceeding	
Asking questions and recognising Ask their own scientific Suggest their own scientific questions using Generate their own scientific questions to ask. This Theorise questions to ask	
that they can be answered in questions based on prior their own prior knowledge or based on a may be stimulated by a scientific experience or asking developed from their own their own different ways knowledge and learning. previously taught scientific enquiry. further questions based on their developed knowledge and linked to a	
Planning different types of Pl	
scientific enquiries to answer List possible resources Identify the type of enquiry to answer their enquiry already ma	de.
questions. and discuss with others own questions and explain their choice. Choose an enquiry type to carry out and justify their	
Test types: how to gather evidence to answer a scientific Choose from a range of resources and decide choice. Create a suitable enquiry by	
identifying and classifying question. In discussion with others how to gather Select from a wide range of resources and decide how out in response to a quest	
observing over time evidence to answer a scientific question. to gather evidence to answer a scientific question	
fair testing Reflect on when and how sources can be used to	, ,
used to answer questions that cannot be Pergraige how secondary sources can be used to questions that cannot be	
researching using secondary sources answer questions that cannot be answered through practical work.	ork.
answered through practical work. researching using secondary sources answered through practical work. researching using secondary sources answer questions that cannot be answered through practical work. The provided researching using secondary sources answer questions that cannot be answered through practical work.	
Engaging in practical enquiry to Follow plans to carry out Carry out fair tests, recognise variables and Carry out fair tests, recognise and control variables. Predict when variables may	need to be
answer questions fair tests, through group suggest how to control them.	
Recognising and controlling discussion identify variables and discuss how variables where preserved variables where variables where preserved variables where vari	:-
variables where necessary. to control them. gather evidence. variables where necessary. to control them. gather evidence. Evaluate the effectiveness	of practical
Decide what observations or measurements to make resources when selecting	
Select from a given range Discuss how to gather evidence to answer over time and for how long. the gathering of evidence of practical resources. their own questions. observations and measu	_
Examine for patterns and relationships using a suitable	ements.
Gather evidence to answer Explain patterns and relationships. sample. Analyse for patterns and re	•
their own questions. using a suitable sample an	
what future patterns m	gnt be.
Making observations and taking Select and use a range of Apply knowledge of how to use a range of Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on why certain making Select measuring equipment to give the most precise Reflect on which the most precise Reflect on which the most precise Reflect on the most precise Reflect	easuring
measurements different equipment to equipment for taking accurate measurements results. equipment is chosen to give	e accurate
Taking measurements, using a range of scientific equipment. Taking measurements, using a range of scientific equipment. Taking measurements, using a range of scientific equipment. Taking measurements, using a using standard units of measurement. Taking measurements, using a using standard units of measurement. Taking measure or trundle wheel, force meter using standard units of measurement.	
measurements Taking measurements, using a range of scientific equipment. Describe simple different equipment to take measurements of: length, time, temperature and capacity using standard units of measurement. Describe simple different equipment to take measurements of: length, time, temperature and capacity using standard units of measurement. Describe simple equipment for taking accurate measurements of: length, time, temperature and capacity using standard units of measurement. Describe simple Hypothesise when repeat	readings
observations by making E.g using thermometers and data loggers. might need to be made in company the company the company that the company the company that th	

•	 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).	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.	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.
ρ0	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.	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.

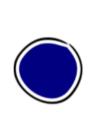
SOLO Taxonomy

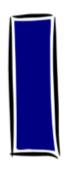
Biggs and Collis 1982

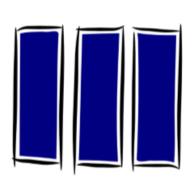
Define Identify Do simple procedure Define
Describe
List
Do algorithm
Combine

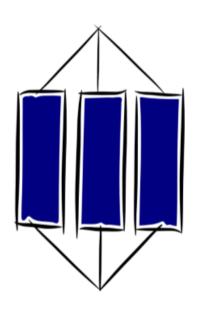
Formulate questions
Compare/contrast
Explain causes
Sequence
Classify
Analyse -part/whole
Relate
Analogy

Evaluate
Theorise
Generalise
Predict
Create
Imagine
Hypothesise
Reflect









Apply

