Science Progression Pathway

Core Skill	Progression Steps				
	Beginning less than 3	**Emerging 3-4**	**Developed 5-6**	**Sophisticated 7-8**	**Excellence 8+/9**
Scientific knowledge	State similarities and differences observed Make basic comparisons Identify simple scientific concepts Use simple descriptions and definitions Sort and group objects	Basically describe scientific concepts Identify links within science Use simple models to describe ideas Identify evidence to support an argument or idea	Describe scientific concepts and observations Identify strengths and weaknesses in models Some evidence in description used to support ideas Basic structure in answers	Describe scientific concepts and observations in detail Use evidence to support answers and arguments Make connections between ideas when explaining a concept or process Systematic approach to explain facts Selects appropriate evidence to support ideas	Fully describe scientific ideas and observations. Explain scientific ideas logically and in detail Use abstract ideas and models from all areas in science Make detailed statements supported by evidence. Justify approach to evaluation of arguments and explanations Analyse new and accepted scientific theory and ideas
Understanding science in the world	Express personal feelings or opinions Describe, in familiar contexts, how science helps people Identify people who use science to help others Identify uses of scientific or technological phenomena and say whether or not they are helpful	Describe some simple positive and negative consequences Recognise applications of specific scientific ideas Identify aspects of science used within particular jobs or roles	Describe how different decisions may be made in different economic, social or cultural contexts Explain how societies are affected Describe how particular scientific developments have provided evidence to help scientists pose and answer further questions Describe how aspects of science are applied in particular jobs or roles	Suggest ways in which scientific developments may be influenced Explain how scientific discoveries can change worldviews Suggest economic, ethical/moral, social or cultural arguments for development Explain how creative thinking in science generates ideas for future research and development	Describe ways in which the values of a society influence the nature of the science developed in that society or period of history Evaluate the effects of development on society as a whole Explain the unintended consequences that may arise from development Make balanced judgements about development by evaluating the economic,

					ethical/moral, social or cultural implications
Communication in science	Present ideas and evidence in appropriate ways Respond to prompts by using simple texts and electronic media to find information Use simple scientific vocabulary to describe their ideas and observations Work together on an investigation and recognise contributions made by others	Select appropriate ways of presenting scientific data Use appropriate scientific forms of language to communicate Use scientific and mathematical conventions	Identify lack of balance in the presentation of evidence Choose appropriate forms to communicate qualitative or quantitative data Distinguish between data and information from primary sources and secondary sources	Explain how information or evidence from various sources may been manipulated to influence interpretation Effectively represent abstract ideas using appropriate symbols, flow diagrams and different kinds of graphs in presenting explanations and arguments	Critically evaluate information and evidence from various sources, explaining limitations, misrepresentation or lack of balance Present robust and well-structured explanations, arguments or counter arguments in a variety of ways Suggest the specialisms and skills that would be needed to solve particular scientific problems or to generate particular new scientific or technological developments
Investigation Planning	Respond to prompts to make suggestions about how to find things out Identify things to measure or observe that are relevant to what they are investigating Plan a simple method Basic idea of safety and risk	Identify one or more control variables in investigations from those provided Identify two variables that may show a link Make a prediction Select appropriate equipment Describe how to control the control variables Start to identify range and suitable intervals.	Think of a hypothesis and suggest an experiment to test it Apply scientific knowledge and understanding in the planning identify significant variables and recognising which are independent and which are dependent Justify their choices of data collection method and proposed number of	Formulate questions or ideas that can be investigated and develop a hypothesis Predict what will happen if the hypothesis is correct Write a question linking the dependent and independent variables Identify key variables in complex contexts, explaining why some cannot readily be controlled and planning	Justify their choice of strategies for investigating different kinds of scientific questions, using scientific knowledge and understanding Choose and justify data collection methods that minimise error, and produce precise and reliable data Adapt their approaches to practical work to control risk by consulting

		Recognise possible risks	observations and measurements Choose a suitable range for the independent and dependent variables. Decide how to change the independent variable Independently recognise a range of familiar risks and take action to control them Know the difference between a hazard and a risk	appropriate approaches to investigations to take account of this Explain how to take account of sources of error in order to collect reliable data Determine the nature of the hazard and suggest how likely it is to happen Recognise the need for risk assessments and act on, appropriate sources of information	appropriate resources and expert advice
Investigation collecting and presenting data	Correctly use equipment provided to make simple observations and measurements Needs support to identify best way to record data	Make accurate observations and measurements relevant to the investigation Gather sufficient data and repeat if appropriate Select an appropriate way to display data Use equipment correctly Record the observation to be explained	Gather data minimising errors Test suitability of measuring instrument Record observations using scientific language Results recorded in detail, to correct decimal place Table of results accurate	Identify and record key features of an observation Explain why different kinds of data are better displayed on different graphs	Can explain the use of a preliminary investigation Justifies changes in investigation Data presented accurately and in a rage of appropriate formats
Investigation Conclusions	Respond to prompts and say what happened in their investigation Say what has changed and whether what happened was what they expected	Identify scientific evidence they have used in drawing conclusions Suggest improvements to their working	Use scientific knowledge and understanding to give reasons for any limitations or inconsistencies in evidence collected Correctly identifies anomalies	Identify quantitative relationships between variables, using them to inform conclusions and make further predictions Assess the strength of evidence, deciding whether	Propose scientific explanations for unexpected observations or measurements, making allowances for anomalies

	Respond to prompts to suggest different ways they could have done things Identify basic patterns or data that doesn't fit the pattern Select relevant data	methods, giving reasons Suggest relationship between variables Develop an explanation Describe how anomalous data can affect conclusion Decide if conclusion agrees with prediction Identify reliable and accurate results	Draw valid conclusion using evidence and graphs/numeric data across a range of contexts and suggest improvements with reasons State whether the hypothesis is correct Incorporate patterns identified into the answer to the investigation Decide appropriate action if conclusion does not agree with the prediction Judge whether the conclusion is supported by the data Basic explanation of accuracy and reliability Describe how an experiment is reproducible	it is sufficient to support a conclusion Explain ways of modifying working methods to improve reliability Express a linear relationship between variables Justify whether anomalous results can be explained or ignored Suggest a scientific reason for the findings Explain why the evidence supports the hypothesis Explain why results are accurate and reliable Explain reproducibility	Critically interpret, evaluate and synthesise conflicting evidence Suggest and justify improvements to experimental procedures using detailed scientific knowledge and understanding and suggest coherent strategies to take particular investigations further

Mathematical skills and data analysis	Can identify equations to use with support. Limited to ability to rearrange. Limited ability to use calculation without example to follow. Draw basic conclusions from data Draw a simple graph Use appropriate scales with help.	Use some equations correctly. Some recall with limited ability to use. Some calculations used correctly with support. Identify patterns in data presented in various formats. Draw basic conclusions from data and link to cause and effect Can decide which graph to use without prompt. Some help with scale and line of best fit	Recall and apply most equations. State equations to use. Some calculations used correctly. Interpret data from various formats Select correct data in drawing conclusions and link to scientific knowledge Make valid comments on quality of data Choose appropriate graph Draw appropriate scales and line or curve of best fit through the points Extrapolate data from a graph Label x axis with the independent variable and the y axis with the dependent	Fully use almost all equations correctly. Recall correct equation and rearrange. Use most calculations correctly in detail. Explain how data can be interpreted in different ways and how unexpected outcomes could be significant Choose appropriate graph and scale including decimal and negative values Calculate the tangent of a straight line within a scatter graph Explain the choice of starting point for axis, zero or non-zero Explain choice of line or curve of best fit	Fully understand the use of equations and be able to rearrange and apply. Fully understand the calculations in Science and be able to recall and apply. Process data, including using multi-step calculations and compound measures, to identify complex relationships between variables Interpolate and extrapolate from a complex graph and use the values as part of an explanation Start to use statistical analysis