

# Assessment criteria: science

	AF1 – Thinking scientifically	AF2 – Understanding the applications and implications of science	AF3 – Communicating and collaborating in science	AF4 – Using investigative approaches	AF5 – Working critically with evidence
<b>Level 8</b>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Describe or explain processes or phenomena, logically and in detail, making use of abstract ideas and models from different areas of science</li> <li>Select and justify an appropriate approach to evaluating the relative importance of a number of different factors in explanations or arguments</li> <li>Analyse the development of scientific theories through the emergence of new, accepted ideas and evidence</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Describe ways in which the values of a society influence the nature of the science developed in that society or period of history</li> <li>Evaluate the effects of scientific or technological developments on society as a whole</li> <li>Explain the unintended consequences that may arise from scientific and technological developments</li> <li>Make balanced judgements about particular scientific or technological developments by evaluating the economic, ethical/moral, social or cultural implications</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Critically evaluate information and evidence from various sources, explaining limitations, misrepresentation or lack of balance</li> <li>Present robust and well structured explanations, arguments or counter arguments in a variety of ways</li> <li>Suggest the specialisms and skills that would be needed to solve particular scientific problems or to generate particular new scientific or technological developments</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Justify their choice of strategies for investigating different kinds of scientific questions, using scientific knowledge and understanding</li> <li>Choose and justify data collection methods that minimise error, and produce precise and reliable data</li> <li>Adapt their approaches to practical work to control risk by consulting appropriate resources and expert advice</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Propose scientific explanations for unexpected observations or measurements, making allowances for anomalies</li> <li>Process data, including using multi-step calculations and compound measures, to identify complex relationships between variables</li> <li>Critically interpret, evaluate and synthesise conflicting evidence</li> <li>Suggest and justify improvements to experimental procedures using detailed scientific knowledge and understanding and suggest coherent strategies to take particular investigations further</li> </ul>
<b>Level 7</b>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Make explicit connections between abstract ideas and/or models in explaining processes or phenomena</li> <li>Employ a systematic approach in deciding the relative importance of a number of scientific factors when explaining processes or phenomena</li> <li>Explain how different pieces of evidence support accepted scientific ideas or contribute to questions that science cannot fully answer</li> <li>Explain the processes by which ideas and evidence are accepted or rejected by the scientific community</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Suggest ways in which scientific and technological developments may be influenced</li> <li>Explain how scientific discoveries can change worldviews</li> <li>Suggest economic, ethical/moral, social or cultural arguments for and against scientific or technological developments</li> <li>Explain how creative thinking in science and technology generates ideas for future research and development</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Explain how information or evidence from various sources may be manipulated in order to influence interpretation</li> <li>Effectively represent abstract ideas using appropriate symbols, flow diagrams and different kinds of graphs in presenting explanations and arguments</li> <li>Explain how scientists with different specialisms and skills have contributed to particular scientific or technological developments</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Formulate questions or ideas that can be investigated by synthesising information from a range of sources</li> <li>Identify key variables in complex contexts, explaining why some cannot readily be controlled and planning appropriate approaches to investigations to take account of this</li> <li>Explain how to take account of sources of error in order to collect reliable data</li> <li>Recognise the need for risk assessments and consult, and act on, appropriate sources of information</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Explain how data can be interpreted in different ways and how unexpected outcomes could be significant</li> <li>Identify quantitative relationships between variables, using them to inform conclusions and make further predictions</li> <li>Assess the strength of evidence, deciding whether it is sufficient to support a conclusion</li> <li>Explain ways of modifying working methods to improve reliability</li> </ul>
<b>Level 6</b>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Use abstract ideas or models or multiple factors when explaining processes or phenomena</li> <li>Identify the strengths and weaknesses of particular models</li> <li>Describe some scientific evidence that supports or refutes particular ideas or arguments, including those in development</li> <li>Explain how new scientific evidence is discussed and interpreted by the scientific community and how this may lead to changes in scientific ideas</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Describe how different decisions on the uses of scientific and technological developments may be made in different economic, social or cultural contexts</li> <li>Explain how societies are affected by particular scientific applications or ideas</li> <li>Describe how particular scientific or technological developments have provided evidence to help scientists pose and answer further questions</li> <li>Describe how aspects of science are applied in particular jobs or roles</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Identify lack of balance in the presentation of information or evidence</li> <li>Choose forms to communicate qualitative or quantitative data appropriate to the data and the purpose of the communication</li> <li>Distinguish between data and information from primary sources, secondary sources and simulations, and present them in the most appropriate form</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Apply scientific knowledge and understanding in the planning of investigations, identifying significant variables and recognising which are independent and which are dependent</li> <li>Justify their choices of data collection method and proposed number of observations and measurements</li> <li>Collect data choosing appropriate ranges, numbers and values for measurements and observations</li> <li>Independently recognise a range of familiar risks and take action to control them</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Suggest reasons based on scientific knowledge and understanding for any limitations or inconsistencies in evidence collected</li> <li>Select and manipulate data and information and use them to contribute to conclusions</li> <li>Draw conclusions that are consistent with the evidence they have collected and explain them using scientific knowledge and understanding</li> <li>Make valid comments on the quality of their data</li> </ul>
<b>Level 5</b>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Use abstract ideas or models or more than one step when describing processes or phenomena</li> <li>Explain processes or phenomena, suggest solutions to problems or answer questions by drawing on abstract ideas or models</li> <li>Recognise scientific questions that do not yet have definitive answers</li> <li>Identify the use of evidence and creative thinking by scientists in the development of scientific ideas</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Describe different viewpoints a range of people may have about scientific or technological developments</li> <li>Indicate how scientific or technological developments may affect different groups of people in different ways</li> <li>Identify ethical or moral issues linked to scientific or technological developments</li> <li>Link applications of science or technology to their underpinning scientific ideas</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Distinguish between opinion and scientific evidence in contexts related to science, and use evidence rather than opinion to support or challenge scientific arguments</li> <li>Decide on the most appropriate formats to present sets of scientific data, such as using line graphs for continuous variables</li> <li>Use appropriate scientific and mathematical conventions and terminology to communicate abstract ideas</li> <li>Suggest how collaborative approaches to specific experiments or investigations may improve the evidence collected</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Recognise significant variables in investigations, selecting the most suitable to investigate</li> <li>Explain why particular pieces of equipment or information sources are appropriate for the questions or ideas under investigation</li> <li>Repeat sets of observations or measurements where appropriate, selecting suitable ranges and intervals</li> <li>Make, and act on, suggestions to control obvious risks to themselves and others</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Interpret data in a variety of formats, recognising obvious inconsistencies</li> <li>Provide straightforward explanations for differences in repeated observations or measurements</li> <li>Draw valid conclusions that utilise more than one piece of supporting evidence, including numerical data and line graphs</li> <li>Evaluate the effectiveness of their working methods, making practical suggestions for improving them</li> </ul>
<b>Level 4</b>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Use scientific ideas when describing simple processes or phenomena</li> <li>Use simple models to describe scientific ideas</li> <li>Identify scientific evidence that is being used to support or refute ideas or arguments</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Describe some simple positive and negative consequences of scientific and technological developments</li> <li>Recognise applications of specific scientific ideas</li> <li>Identify aspects of science used within particular jobs or roles</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Select appropriate ways of presenting scientific data</li> <li>Use appropriate scientific forms of language to communicate scientific ideas, processes or phenomena</li> <li>Use scientific and mathematical conventions when communicating information or ideas</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Decide when it is appropriate to carry out fair tests in investigations</li> <li>Select appropriate equipment or information sources to address specific questions or ideas under investigation</li> <li>Make sets of observations or measurements, identifying the ranges and intervals used</li> <li>Identify possible risks to themselves and others</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Identify patterns in data presented in various formats, including line graphs</li> <li>Draw straightforward conclusions from data presented in various formats</li> <li>Identify scientific evidence they have used in drawing conclusions</li> <li>Suggest improvements to their working methods, giving reasons</li> </ul>
<b>Level 3</b>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Identify differences, similarities or changes related to simple scientific ideas, processes or phenomena</li> <li>Respond to ideas given to them to answer questions or suggest solutions to problems</li> <li>Represent things in the real world using simple physical models</li> <li>Use straightforward scientific evidence to answer questions, or to support their findings</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Explain the purposes of a variety of scientific or technological developments</li> <li>Link applications to specific characteristics or properties</li> <li>Identify aspects of our lives, or of the work that people do, which are based on scientific ideas</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Present simple scientific data in more than one way, including tables and bar charts</li> <li>Use scientific forms of language when communicating simple scientific ideas, processes or phenomena</li> <li>Identify simple advantages of working together on experiments or investigations</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Identify one or more control variables in investigations from those provided</li> <li>Select equipment or information sources from those provided to address a question or idea under investigation</li> <li>Make some accurate observations or whole number measurements relevant to questions or ideas under investigation</li> <li>Recognise obvious risks when prompted</li> </ul>	<p><b>Across a range of contexts and practical situations pupils:</b></p> <ul style="list-style-type: none"> <li>Identify straightforward patterns in observations or in data presented in various formats, including tables, pie and bar charts</li> <li>Describe what they have found out in experiments or investigations, linking cause and effect</li> <li>Suggest improvements to their working methods</li> </ul>