

APP matching chart: Levels 7–8

	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
Level 8	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Describe or explain processes or phenomena, logically and in detail, making use of abstract ideas and models from different areas of science Select and justify an appropriate approach to evaluating the relative importance of a number of different factors in explanations or arguments Analyse the development of scientific theories through the emergence of new, accepted ideas and evidence 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> 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 scientific or technological developments on society as a whole Explain the unintended consequences that may arise from scientific and technological developments Make balanced judgements about particular scientific or technological developments by evaluating the economic, ethical/moral, social or cultural implications 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> 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 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> 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 appropriate resources and expert advice 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Propose scientific explanations for unexpected observations or measurements, making allowances for anomalies Process data, including using multi-step calculations and compound measures, to identify complex relationships between variables 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
Book 1 APP opportunities on pages:	67				
Level 7	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Make explicit connections between abstract ideas and/or models in explaining processes or phenomena Employ a systematic approach in deciding the relative importance of a number of scientific factors when explaining processes or phenomena Explain how different pieces of evidence support accepted scientific ideas or contribute to questions that science cannot fully answer Explain the processes by which ideas and evidence are accepted or rejected by the scientific community 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Suggest ways in which scientific and technological developments may be influenced Explain how scientific discoveries can change worldviews Suggest economic, ethical/moral, social or cultural arguments for and against scientific or technological developments Explain how creative thinking in science and technology generates ideas for future research and development 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Explain how information or evidence from various sources may have been manipulated in order to influence interpretation Effectively represent abstract ideas using appropriate symbols, flow diagrams and different kinds of graphs in presenting explanations and arguments Explain how scientists with different specialisms and skills have contributed to particular scientific or technological developments 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Formulate questions or ideas that can be investigated by synthesising information from a range of sources Identify key variables in complex contexts, explaining why some cannot readily be controlled and planning appropriate approaches to investigations to take account of this Explain how to take account of sources of error in order to collect reliable data Recognise the need for risk assessments and consult, and act on, appropriate sources of information 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Explain how data can be interpreted in different ways and how unexpected outcomes could be significant Identify quantitative relationships between variables, using them to inform conclusions and make further predictions Assess the strength of evidence, deciding whether it is sufficient to support a conclusion Explain ways of modifying working methods to improve reliability
Book 1 APP opportunities on pages:	23 67 87 97 103 107 129	17 23 151 207	17 23 169 191 199 201	35 53 153	13 59 63 195

APP matching chart: Levels 6–7

	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
Level 7	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Make explicit connections between abstract ideas and/or models in explaining processes or phenomena • Employ a systematic approach in deciding the relative importance of a number of scientific factors when explaining processes or phenomena • Explain how different pieces of evidence support accepted scientific ideas or contribute to questions that science cannot fully answer • Explain the processes by which ideas and evidence are accepted or rejected by the scientific community 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Suggest ways in which scientific and technological developments may be influenced • Explain how scientific discoveries can change worldviews • Suggest economic, ethical/moral, social or cultural arguments for and against scientific or technological developments • Explain how creative thinking in science and technology generates ideas for future research and development 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Explain how information or evidence from various sources may have been manipulated in order to influence interpretation • Effectively represent abstract ideas using appropriate symbols, flow diagrams and different kinds of graphs in presenting explanations and arguments • Explain how scientists with different specialisms and skills have contributed to particular scientific or technological developments 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Formulate questions or ideas that can be investigated by synthesising information from a range of sources • Identify key variables in complex contexts, explaining why some cannot readily be controlled and planning appropriate approaches to investigations to take account of this • Explain how to take account of sources of error in order to collect reliable data • Recognise the need for risk assessments and consult, and act on, appropriate sources of information 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Explain how data can be interpreted in different ways and how unexpected outcomes could be significant • Identify quantitative relationships between variables, using them to inform conclusions and make further predictions • Assess the strength of evidence, deciding whether it is sufficient to support a conclusion • Explain ways of modifying working methods to improve reliability
Book 1 APP opportunities on pages:	23 67 87 97 103 107 129	17 23 151 207	17 23 169 191 199 201	35 53 153	13 59 63 195
Level 6	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Use abstract ideas or models or multiple factors when explaining processes or phenomena • Identify the strengths and weaknesses of particular models • Describe some scientific evidence that supports or refutes particular ideas or arguments, including those in development • Explain how new scientific evidence is discussed and interpreted by the scientific community and how this may lead to changes in scientific ideas 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Describe how different decisions on the uses of scientific and technological developments may be made in different economic, social or cultural contexts • Explain how societies are affected by particular scientific applications or ideas • Describe how particular scientific or technological developments have provided evidence to help scientists pose and answer further questions • Describe how aspects of science are applied in particular jobs or roles 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Identify lack of balance in the presentation of information or evidence • Choose forms to communicate qualitative or quantitative data appropriate to the data and the purpose of the communication • Distinguish between data and information from primary sources, secondary sources and simulations, and present them in the most appropriate form 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Apply scientific knowledge and understanding in the planning of investigations, identifying significant variables and recognising which are independent and which are dependent • Justify their choices of data collection method and proposed number of observations and measurements • Collect data choosing appropriate ranges, numbers and values for measurements and observations • Independently recognise a range of familiar risks and take action to control them 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Suggest reasons based on scientific knowledge and understanding for any limitations or inconsistencies in evidence collected • Select and manipulate data and information and use them to contribute to conclusions • Draw conclusions that are consistent with the evidence they have collected and explain them using scientific knowledge and understanding • Make valid comments on the quality of their data
Book 1 APP opportunities on pages:	23 35 67 73 87 97 103 107 127 129 191 195 199 203	17 23 37 39 79 105 123 125 151 165 205 207	11 35 43 45 155 169 191 199 201	53 55 59 115 123 149 153 167 171 173 175	13 59 63 65 71 75 77 91 93 171 173 174 175 195

APP matching chart: Levels 5–6

	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
Level 6	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Use abstract ideas or models or multiple factors when explaining processes or phenomena • Identify the strengths and weaknesses of particular models • Describe some scientific evidence that supports or refutes particular ideas or arguments, including those in development • Explain how new scientific evidence is discussed and interpreted by the scientific community and how this may lead to changes in scientific ideas 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Describe how different decisions on the uses of scientific and technological developments may be made in different economic, social or cultural contexts • Explain how societies are affected by particular scientific applications or ideas • Describe how particular scientific or technological developments have provided evidence to help scientists pose and answer further questions • Describe how aspects of science are applied in particular jobs or roles 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Identify lack of balance in the presentation of information or evidence • Choose forms to communicate qualitative or quantitative data appropriate to the data and the purpose of the communication • Distinguish between data and information from primary sources, secondary sources and simulations, and present them in the most appropriate form 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Apply scientific knowledge and understanding in the planning of investigations, identifying significant variables and recognising which are independent and which are dependent • Justify their choices of data collection method and proposed number of observations and measurements • Collect data choosing appropriate ranges, numbers and values for measurements and observations • Independently recognise a range of familiar risks and take action to control them 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Suggest reasons based on scientific knowledge and understanding for any limitations or inconsistencies in evidence collected • Select and manipulate data and information and use them to contribute to conclusions • Draw conclusions that are consistent with the evidence they have collected and explain them using scientific knowledge and understanding • Make valid comments on the quality of their data
Book 1 APP opportunities on pages:	23 35 67 73 87 97 103 107 127 129 191 195 199 203	17 23 37 39 79 105 123 125 151 165 205 207	11 35 43 45 155 169 191 199 201	53 55 59 115 123 149 153 167 171 173 175	13 59 63 65 71 75 77 91 93 171 173 174 175 195
Level 5	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Use abstract ideas or models or more than one step when describing processes or phenomena • Explain processes or phenomena, suggest solutions to problems or answer questions by drawing on abstract ideas or models • Recognise scientific questions that do not yet have definitive answers • Identify the use of evidence and creative thinking by scientists in the development of scientific ideas 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Describe different viewpoints a range of people may have about scientific or technological developments • Indicate how scientific or technological developments may affect different groups of people in different ways • Identify ethical or moral issues linked to scientific or technological developments • Link applications of science or technology to their underpinning scientific ideas 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Distinguish between opinion and scientific evidence in contexts related to science, and use evidence rather than opinion to support or challenge scientific arguments • Decide on the most appropriate formats to present sets of scientific data, such as using line graphs for continuous variables • Use appropriate scientific and mathematical conventions and terminology to communicate abstract ideas • Suggest how collaborative approaches to specific experiments or investigations may improve the evidence collected 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Recognise significant variables in investigations, selecting the most suitable to investigate • Explain why particular pieces of equipment or information sources are appropriate for the questions or ideas under investigation • Repeat sets of observations or measurements where appropriate, selecting suitable ranges and intervals • Make, and act on, suggestions to control obvious risks to themselves and others 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> • Interpret data in a variety of formats, recognising obvious inconsistencies • Provide straightforward explanations for differences in repeated observations or measurements • Draw valid conclusions that utilise more than one piece of supporting evidence, including numerical data and line graphs • Evaluate the effectiveness of their working methods, making practical suggestions for improving them
Book 1 APP opportunities on pages:	67 73 87 97 103 129 153 191 195 199 203	23 37 39 79 97 105 123 125 151 205 207	11 31 35 43 45 117 125 169 155 167	15 53 55 59 115 123 149 153 171 175	45 63 65 71 75 77 91 93 115 171 173 174 175 177

APP matching chart: Levels 4–5

	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
Level 5	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Use abstract ideas or models or more than one step when describing processes or phenomena Explain processes or phenomena, suggest solutions to problems or answer questions by drawing on abstract ideas or models Recognise scientific questions that do not yet have definitive answers Identify the use of evidence and creative thinking by scientists in the development of scientific ideas 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Describe different viewpoints a range of people may have about scientific or technological developments Indicate how scientific or technological developments may affect different groups of people in different ways Identify ethical or moral issues linked to scientific or technological developments Link applications of science or technology to their underpinning scientific ideas 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Distinguish between opinion and scientific evidence in contexts related to science, and use evidence rather than opinion to support or challenge scientific arguments Decide on the most appropriate formats to present sets of scientific data, such as using line graphs for continuous variables Use appropriate scientific and mathematical conventions and terminology to communicate abstract ideas Suggest how collaborative approaches to specific experiments or investigations may improve the evidence collected 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Recognise significant variables in investigations, selecting the most suitable to investigate Explain why particular pieces of equipment or information sources are appropriate for the questions or ideas under investigation Repeat sets of observations or measurements where appropriate, selecting suitable ranges and intervals Make, and act on, suggestions to control obvious risks to themselves and others 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Interpret data in a variety of formats, recognising obvious inconsistencies Provide straightforward explanations for differences in repeated observations or measurements Draw valid conclusions that utilise more than one piece of supporting evidence, including numerical data and line graphs Evaluate the effectiveness of their working methods, making practical suggestions for improving them
Book 1 APP opportunities on pages:	67 73 87 97 103 129 153 191 195 199 203	23 37 39 79 97 105 123 125 151 205 207	11 31 35 43 45 117 125 169 155 167	15 53 55 59 115 123 149 153 171 175	45 63 65 71 75 77 91 93 115 171 173 174 175 177
Level 4	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Use scientific ideas when describing simple processes or phenomena Use simple models to describe scientific ideas Identify scientific evidence that is being used to support or refute ideas or arguments 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Describe some simple positive and negative consequences of scientific and technological developments Recognise applications of specific scientific ideas Identify aspects of science used within particular jobs or roles 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Select appropriate ways of presenting scientific data Use appropriate scientific forms of language to communicate scientific ideas, processes or phenomena Use scientific and mathematical conventions when communicating information or ideas 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Decide when it is appropriate to carry out fair tests in investigations Select appropriate equipment or information sources to address specific questions or ideas under investigation Make sets of observations or measurements, identifying the ranges and intervals used Identify possible risks to themselves and others 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Identify patterns in data presented in various formats, including line graphs Draw straightforward conclusions from data presented in various formats Identify scientific evidence they have used in drawing conclusions Suggest improvements to their working methods, giving reasons
Book 1 APP opportunities on pages:	59 61 63 67 72 77 87 89 91 93 97 101 103 153 187 191 195 199 201 203	37 39 67 79 97 105 125 204 205 206 207	31 43 45 103 117 125 169	11 13 15 53 55 57 65 115 171	45 63 65 71 75 77 91 93 95 107 115 171 173 174 189 193

APP matching chart: Levels 3–4

	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
Level 4	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Use scientific ideas when describing simple processes or phenomena Use simple models to describe scientific ideas Identify scientific evidence that is being used to support or refute ideas or arguments 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Describe some simple positive and negative consequences of scientific and technological developments Recognise applications of specific scientific ideas Identify aspects of science used within particular jobs or roles 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Select appropriate ways of presenting scientific data Use appropriate scientific forms of language to communicate scientific ideas, processes or phenomena Use scientific and mathematical conventions when communicating information or ideas 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Decide when it is appropriate to carry out fair tests in investigations Select appropriate equipment or information sources to address specific questions or ideas under investigation Make sets of observations or measurements, identifying the ranges and intervals used Identify possible risks to themselves and others 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Identify patterns in data presented in various formats, including line graphs Draw straightforward conclusions from data presented in various formats Identify scientific evidence they have used in drawing conclusions Suggest improvements to their working methods, giving reasons
Book 1 APP opportunities on pages:	59 61 63 67 72 77 87 89 91 93 97 101 103 153 187 191 195 199 201 203	37 39 67 79 97 105 125 204 205 206 207	31 43 45 103 117 125 169	11 13 15 53 55 57 65 115 171	45 63 65 71 75 77 91 93 95 107 115 171 173 174 189 193
Level 3	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Identify differences, similarities or changes related to simple scientific ideas, processes or phenomena Respond to ideas given to them to answer questions or suggest solutions to problems Represent things in the real world using simple physical models Use straightforward scientific evidence to answer questions, or to support their findings 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Explain the purposes of a variety of scientific or technological developments Link applications to specific characteristics or properties Identify aspects of our lives, or of the work that people do, which are based on scientific ideas 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Present simple scientific data in more than one way, including tables and bar charts Use scientific forms of language when communicating simple scientific ideas, processes or phenomena Identify simple advantages of working together on experiments or investigations 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Identify one or more control variables in investigations from those provided Select equipment or information sources from those provided to address a question or idea under investigation Make some accurate observations or whole number measurements relevant to questions or ideas under investigation Recognise obvious risks when prompted 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> Identify straightforward patterns in observations or in data presented in various formats, including tables, pie and bar charts Describe what they have found out in experiments or investigations, linking cause and effect Suggest improvements to their working methods
Book 1 APP opportunities on pages:	59 61 63 72 77 89 91 93 101 187 195 199 201	67 79 105 204 206	31 45 103	11 13 15 53 55 57 65 115	45 71 75 95 107 115 173 189 193