

Skill Area	Skill area	Teacher	The young scientist CAN	Students should therefore be able to...	7	8	9	10	11	12	13	
<b>Communication in Science</b> <ul style="list-style-type: none"> <li>presentations</li> <li>scientific writing</li> <li>essays</li> <li>reports</li> <li>writing a method</li> </ul>	B1		Write a <b>practical report</b> including rationale hypothesis, aim, method, safety, results, conclusion, evaluation, abstract and appendix	B1.1 Write a scientific report that contains sections in the correct order B1.2 Create an accurate and easy to follow practical method B1.3 Safely assess the risks and hazards in an experiment B1.4 Create an abstract that summarises a scientific report (LSS5.8,LSS5.9) B1.5 Organise additional information for a project in an appendix B1.6 Create a scientific article (LSS5.4) B1.7 Write in a scientific way (LSS5.2) B1.8 Write up a practical as a research paper	B1.1 B1.2 B1.3	B1.4	B1.5	B1.6	B1.7 B1.8			
	B2		Write a clearly structured <b>scientific essay with referenced sources</b> , annotated diagrams with clear figure legends	B2.1 Write a structured essay inc. introduction, paragraphs and conclusion B2.2 Reference sources using the Harvard system B2.3 Annotate diagrams B2.4 Evaluate different sources used in a piece of writing B2.5 Compiling a bibliography (LSS5.10) B2.6 Write figure legends B2.7 Write a scientific review (LSS5.7)	B2.3	B2.1 B2.2	B2.4	B2.5 B2.6		B2.7		
	B3		Give a <b>clear presentation</b> to communicate a scientific idea using ICT, visual aids and demonstrations	B3.1 Present clearly and effectively using voice, body and language B3.2 Use PPT to communicate a scientific idea effectively (LSS6.1) B3.3 Use a demonstration or model to communicate science effectively B3.4 Present information using a scientific poster (LSS6.4) B3.5 Making the presentation style appropriate to the audience (LSS1.6)	B3.1	B3.2 B3.3		B3.4		B3.5		
	B4		<b>Debate effectively in science</b> by presenting an argument, listening to counter arguments and then responding to questions	B4.1 Use scientific reasoning to formulate and present a motion B4.2 Listen attentively to other students during a debate (LSS2.6) B4.3 Come up with your own questions and respond to others B4.4 Know how to question information (LSS1.7)		B4.1 B4.2 B4.3					B4.4	
<b>Scientific enquiry</b> <ul style="list-style-type: none"> <li>variables</li> <li>validity</li> <li>accuracy</li> <li>reliability</li> <li>precision</li> <li>observations</li> </ul>	D1		<b>Generate a testable hypothesis</b> from an observation and explain this using scientific reasoning	D1.1 Generate a testable hypothesis from an observation D1.2 Explain a hypothesis using scientific reasoning D1.3 Generate a novel hypothesis from observations D1.4 Distinguish between theory, hypothesis and prediction D1.5 Write a practical method that can be easily followed	D1.1 D1.2			D1.3		D1.4		
	D2		Make <b>accurate observations</b> of the natural and physical world e.g. chemical reactions, scale in anatomy, effects of forces	D2.1 Make and record accurate observations on chemical reactions D2.2 Make and record accurate observations on biological material D2.3 Make and record accurate observations on the physical world D2.4 Make and record accurate unprompted observations (LSS2.9)		D2.1 D2.2 D2.3					D2.4	
	D3		<b>Identify variables</b> including the independent, dependent and control variables in an experiment and comment on how variables can be measured, manipulated or kept constant	D3.1 Define and identify the independent variable D3.2 Define and identify the dependent variable D3.3 Define and identify the control variable(s) D3.4 Describe how variables can be manipulated to ensure valid results D3.5 Critique an experimental design	D3.1 D3.2 D3.3				D3.4		D3.5	
	D4		<b>Comment on the reliability, accuracy and precision</b> of an experiment and thereby evaluate a scientific method and the conclusion it draws	D4.1 Define and understand the term reliability D4.2 Define and understand the term validity D4.3 Define and understand the term precision D4.4 Define and understand the term accuracy D4.5 Evaluate a scientific method with reference to the above D4.6 Question the credibility of a conclusion with reference to precision, accuracy, reliability and precision	D4.1 D4.2	D4.3 D4.4		D4.5			D4.6	
<b>Processing data</b> <ul style="list-style-type: none"> <li>graphs</li> <li>tables</li> <li>lines of best fit</li> <li>% error</li> <li>basic operations</li> </ul>	E1		<b>Display data in a range of graphical formats</b> including bar charts, histograms, pie charts, scatter graphs and line graphs	E1.1 Draw a bar graph with correct scale, axis and title E1.2 Draw a histogram with correct scale, axis and title E1.3 Draw a pie chart with correct scale, axis and title E1.4 Draw a line graph with correct scale, axis and title E1.5 Draw a scatter graph with correct scale, axis and title E1.6 Select the best graph to summarise given data E1.7 Use a range of graphical formats to summarise complex continuous and discrete data	E1.1 E1.5	E1.2 E1.3 E1.4	E1.6			E1.7		
	E2		<b>Interpret graphs</b> by drawing lines of best fit and use these to (i) describe trends and patterns in the data and (ii) identify anomalous results	E2.1 Draw a straight line of best fit and recognise when this is valid E2.2 Draw a curved line of best fit and recognise when this is valid E2.3 Identify anomalous results and discuss how anomalous results should be treated when making a conclusion E2.4 Describe trends and patterns in graphs E2.5 Explain trends, patterns or relationships in data and comment on the reliability, drawing a clear conclusion based on the correct interpretation of the data (LSS4.6) E2.6 Translate data successfully from tables to graphs, from diagrams to pose		E2.1 E2.2 E2.3	E2.4	E2.5		E2.6		
	E3		Present data effectively using a <b>range of different table formats</b> and be able to interpret different tables in examination questions	E3.1 Draw appropriate tables (LSS4.6) E3.2 Can draw an appropriate results table for any given method (LSS4.8) E3.3 Process large data sets using tables (LSS4.4)	E3.1			E3.2			E3.3	
	E4		<b>Rearrange equations</b> from first principles and calculate units	E4.1 Rearrange simple equations without the use of triangles E4.2 Calculate simple units from formulae		E4.1		E4.2				
	E5		Calculate the overall <b>% error for an investigation</b> , commenting on how this affects the confidence of a conclusion	E5.1 Calculate % error for different items of common apparatus E5.2 Calculate the total % error for an experiment E5.3 Comment on how the % error affects the confidence of a conclusion E5.4 Calculate the % error for advanced laboratory items e.g. burettes and pipettes and use this to comment on the overall accuracy of conclusions				E5.1 E5.2 E5.3			E5.4	
	E6		<b>Perform common mathematical operations</b> e.g. convert between different SI units, given answers to the correct number of sig figs, calculate units from formulae, percentages, percentage change and standard form	E6.1 State the name, symbol and unit of measurements E6.2 Convert between g and Kg, J and kJ, cm <sup>3</sup> and ml, cm <sup>3</sup> and litres E6.3 Calculate simple percentages and percentage changes E6.4 Give answers to the appropriate number of sig figs E6.5 Use standard form E6.6 Use standard form to convert between units	E6.1	E6.2 E6.3 E6.4	E6.5			E6.6		
<b>Practical Skills</b> <ul style="list-style-type: none"> <li>safe lab work</li> <li>drawing diagrams</li> <li>accurate results</li> <li>working in pairs</li> </ul>	F1		<b>Work as a scientist</b> by carrying out safe, calm and clean practical work, identifying risks and hazards and knowing where the main pieces of apparatus are stored	F1.1 Recall where equipment and reagents are stored in the lab F1.2 Know where to put dirty equipment and common lab waste F1.3 Work in a clean and tidy manner F1.4 Work safely using appropriate safety measures F1.5 Distinguish between hazard and risk F1.6 Identify hazards in the lab F1.7 Demonstrate skilful technique when using basic measuring equipment. F1.8 Consistently demonstrate skilful technique F1.9 Show ingenuity when carrying out a practical investigation	F1.1 F1.2 F1.3 F1.4	F1.5 F1.6	F1.7			F1.8		
	F2		Carry out scientific investigations independently by <b>following a given method</b> and collect and select equipment safely	F2.1 Follow an experimental method successfully F2.2 Collect and select the correct equipment safely and calmly F2.3 Make measurements to the appropriate precision		F2.1 F2.2					F2.3	
	F3		Carry out collaborative practical work by <b>working effectively as a team</b>	F3.1 Work successfully as a practical pair F3.2 Work effectively as a practical pair to solve a problem	F3.1	F3.1		F3.2				
	F4		Can <b>draw scientific diagrams with annotations</b> for apparatus, dissections and cells as seen under a microscope	F4.1 Use scientific diagrams to draw common lab apparatus F4.2 Use scientific notation to draw samples seen under a microscope including labels and scales F4.3 Understanding cross-sections in diagrams (LSS4.3)	F4.1 F4.2		F4.3					
<b>Information retrieval and revision for Prep</b> <ul style="list-style-type: none"> <li>summarising</li> <li>scientific reading</li> <li>revising</li> <li>researching</li> <li>improving exam technique</li> </ul>	G1		<b>Retrieve information</b> using text books effectively to find information including index, table of contents, glossary and chapters. They can also use libraries and other online resources such as Google scholar to gather information and can evaluate the suitability of each source. They can extract information from scientific journals and decide quickly if an article is of use	G1.1 Use a textbook to find relevant information using contents and index (LSS1.3) G1.2 Use the library to find relevant information (LSS1.2) G1.3 Use the internet to find relevant information (LSS1.6, LSS1.2) G1.4 Extract information from scientific articles/journals (LSS3.2, LSS3.5) G1.5 Select useful sources or articles (LSS3.1) G1.6 Locating articles in e-journals using pub med/Google scholar (LSS1.8) G1.7 Evaluate the reliability of a website source (LSS1.11) G1.8 Take notes from a presentation (LSS2.1) G1.9 Use video clips to summarise information	G1.1 G1.2 G1.3		G1.4		G1.5	G1.6	G1.7 G1.8 G1.9	
	G2		<b>Summarise and commit information to memory</b> using notes, mind maps, diagrams, revision cards, mnemonic	G2.1 Identify key concepts in text G2.2 Summarise large pieces of information using concept maps G2.3 Summarise large pieces of information using notes/diagrams G2.4 Memorise large pieces of information using mnemonic G2.5 Memorise large pieces of information using revision cards G2.6 Memorise large pieces of information using flow charts/systems G2.7 Skim read a piece of text G2.8 RACAWAC	G2.1 G2.2	G2.3 G2.4 G2.5	G2.6 G2.7					
	G3		<b>Use the specification</b> to structure revision programs	G3.1 Use the specification to identify what has been covered, what you know and areas for improvement G3.2 Construct a revision timetable G3.3 Use a revision timetable		G3.1	G3.2		G3.3			
	G4		<b>Use mark schemes and examiners reports</b> to reflect and improve their performance in examinations	G4.1 Use mark schemes accurately to mark work using mark scheme abbreviations where appropriate G4.2 Use examiner reports to learn from previous mistakes G4.3 Understand the meaning of command words used in exams G4.4 Appreciate the link between command words and grades G4.5 Use results plus analysis to inform their revision G4.6 Respond appropriately to feedback G4.7 Give feedback that highlights strengths and areas for improvement G4.8 Structure a long answer to meet criteria of the mark scheme	G4.1 G4.2 G4.3	G4.4 G4.5 G4.6 G4.7	G4.8		G4.4	G4.5		