

Progression of Skills: Reasoning and Problem Solving



	EYFS	KS1	Lower KS2	Upper KS2
	Reasoning & Problem Solving	Reasoning & Problem Solving	Reasoning & Problem Solving	Reasoning & Problem Solving
	Pupils should be taught to	Pupils should be taught to	Pupils should be taught to	Pupils should be taught to
Make connections	<p>Uses talk to make links and notice patterns in their experiences</p> <p>Uses their experience to test their ideas and anticipates what might happen</p> <p>Comments and asks questions about aspects of their familiar world</p>	<p>Recognises similarities to previous work through classroom discussion</p> <p>Begins to use familiar elements of knowledge to tackle problems that are more unfamiliar or complex</p> <p>Poses 'What if?' questions during practical problem solving opportunities</p>	<p>Makes connections to previous work within mathematics and with other subjects</p> <p>Poses and answer questions that will help make sense of the problem</p> <p>Poses 'What if?' questions that may change the outcome or direction of the problem</p>	<p>Poses own questions and create problems for peers that are similar to ones worked on in class</p> <p>Develops own lines of enquiry</p>
Evaluate	<p>Questions why things happened and gives explanations</p>	<p>Reviews their work by explaining why they have done something</p>	<p>Suggests refinements to elements of problem solving by comparing other approaches and against 'modelled' examples</p>	<p>Considers efficiency of methods and adapts work accordingly throughout problem solving activities</p>
Draw conclusions	<p>Makes predictions and tests them e.g. developing ideas of grouping, sequences, cause and effect</p> <p>Answers "how and why" questions about their experiences</p>	<p>Predicts an answer or outcome <i>e.g. numbers in an extended sequence</i></p> <p>Talks about findings by referring to own work</p> <p>Explains why an answer is correct</p> <p>Begins to make simple inferences</p>	<p>Predicts conclusions and reason why when referring to work</p> <p>Comments on whether the conclusion was expected</p> <p>Makes valid inferences when referring to own work</p>	<p>Conjectures to develop own line of enquiry when testing outcomes</p> <p>Draws own valid conclusions and give an explanation of reasoning (including written explanations)</p>
Generalise	<p>Recognises similarities between learning experiences and begins to use this understanding in new contexts</p> <p>Realises not only objects, but anything can be counted, including steps,</p>	<p>Understands a general statement by finding a particular example that match it</p> <p>Begins to describe a pattern or sequence in words or using concrete resources or own representation</p>	<p>Finds solutions and makes predictions by identifying patterns when working</p> <p>Forms generalised rules in words, using concrete resources or own representation</p>	<p>Identifies more complex patterns and begins to express generalisations using symbolic notation</p>

	<p>claps or jumps</p> <p>Builds up vocabulary that reflects the breadth of their experiences to describe patterns and characteristics of the world around them</p>			
Justify	<p>Uses talk to clarify thinking</p> <p>Talks about why things happen and how things work</p>	<p>Provides simple reasons for opinions</p>	<p>Justifies answers and solutions by referring to their work and support with examples</p>	<p>Justifies methods chosen and why the solution is the best one or not</p> <p>Supports conclusions with examples and counter examples</p>
Problem solving strategies	<p>Chooses ways to do things</p> <p>Checks how well their activities are going</p> <p>Uses a range of ways to capture experiences</p> <p>Looks closely at similarities, differences, patterns and change</p> <p>Makes decisions about how to approach a task</p>	<p>Sorts information</p> <p>Uses 'guess and check' strategy to solve unfamiliar problems</p> <p>Begins to look for patterns in results while working and uses them to find other possible outcomes</p> <p>Draws simple pictures or diagrams</p> <p>Gives examples to match statements and ones that do not</p> <p>Finds a starting point</p>	<p>Identifies irrelevant information; uses lists and tables to identify and organise information</p> <p>Uses informed 'guess and check'</p> <p>Seeks a pattern</p> <p>Draws a diagram or model</p> <p>Seeks an exception</p> <p>Breaks the problem down into simpler steps - e.g. works backwards</p>	<p>Organises, deconstructs and prioritises information; uses systematic lists and tables to identify information</p> <p>Uses informed 'guess, check and improve'</p> <p>Identifies and uses a pattern</p> <p>Draws a mathematical model to support visualisation of problem</p> <p>Uses and applies negative proof (uses counter argument to prove the rule)</p> <p>Uses a structured approach to tackle the problem (devise a plan) - e.g. works backwards</p> <p>Solves a simpler related problem</p>