

Progression in skills across the primary phase: 'Working Mathematically'

Application	EYFS Statements drawn from CoEL, PSED, CL, L, M, UtW, EAD from 30 – 50 and 40 – 60+	Key Stage One (‘Phase A’)	Lower Key Stage Two (‘Phase B’)	Upper Key Stage Two (‘Phase C’)
Ideas, questions and lines of enquiry	- chooses and identifies ways of bringing mathematical thinking to everyday activities <i>shows curiosity, is willing to have a go and begins to develop an approach e.g. trial and error</i> <i>makes connections and asks questions about aspects that are familiar</i> - selects appropriate resources and adapts work where necessary - asks appropriate questions relevant to the activity and finds new ways to do things	- selects the mathematics they use in an increasing range of classroom activities <i>adopts a suggested model or systematic approach</i> <i>makes connections and applies knowledge to similar situations</i> - chooses equipment appropriate to the task with support - asks simple questions relevant to the problem and begins to suggest ways of exploring	- develops the mathematics they use in a wide range of contexts <i>makes suggestions of ways to tackle a range of problems</i> <i>makes connections to previous work</i> - chooses equipment appropriate to the task independently <i>poses and answers questions related to a problem and suggests a range of possible approaches to the solution</i>	- identifies and obtain necessary information to carry through a task and solve mathematical problems <i>recognises when information is or is not crucial to the solving of a problem</i> <i>determines what is missing and develops lines of enquiry</i> - selects the most appropriate equipment and explains choices - uses their mathematical experiences to explore ideas and raises questions to pursue further lines of enquiry

Represent and communicate	• uses talk to connect ideas and describe what is happening - <i>creates simple representations of the story of the problem</i> • captures experiences and responses in a range of ways - <i>constructs and or makes marks with a purpose in mind</i> - <i>records, using marks that they can interpret and explain</i> • uses talk to organise their activities taking account of one another's ideas and checks how well it is going • in practical activities and discussion, begins to use the vocabulary involved in mathematical thinking	• describes a problem in their own words e.g. - <i>acts it out</i> - <i>represents the problem pictorially or with concrete resources</i> • begins to develop own ways of recording - <i>uses and interprets familiar mathematical symbols and diagrams</i> • begins to organise work and check results - <i>shows evidence of method in responses</i> • discusses their mathematical work and begins to explain their thinking using appropriate mathematical vocabulary	• represents problems pictorially, using a model or with concrete resources - <i>restates the problem in another way</i> • presents work in a clear and organised way - <i>uses and interprets a wide range of mathematical symbols and diagrams</i> • begins to work in an organised way from the start using strategies such as recording results in order and checks for accuracy • discusses their mathematical work and uses mathematical language in a more precise and accurate way	• shows understanding of situations by describing them mathematically using symbols, words and diagrams • decides how best to represent conclusions, using appropriate recording - <i>begins to understand and use formulae and symbols to represent problems</i> • organises work from the outset, looks for ways to record systematically and checks results to see if they are reasonable - <i>checks for and spots errors while working</i> • constructs complex explanations and reasoned arguments
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Plan an approach and implement it	- draws on their knowledge of their familiar world to make decisions about how to approach a task, solve a problem and reach a goal - initiates activities and seeks challenge applying their knowledge of mathematical concepts and appropriate vocabulary e.g. counting, comparing, pattern making - checks how well their activities are going, changes strategy as needed and reviews how well the approach worked	- understands and uses known facts and procedures to solve simple problems - uses familiar strategies and operations to solve problems within known mathematical concepts and procedures - tries different approaches and finds ways of overcoming difficulties when solving problems – sometimes with support	- uses facts and procedures to solve simple and more complex problems - develops own strategies for solving problems and applying mathematics to practical contexts - finds solutions that match the context of the problem	- understands and uses facts and procedures creatively to solve complex or unfamiliar problems - uses appropriate mathematical concepts, processes, skills and tools to solve a problem - interprets the mathematical solution in the context of the problem and makes sense of the solution
Computational complexity (Within the range of number facts known)	- shows an interest in number problems - responds to instructions involving a two-part sequence	solves problems with one or a small number of steps, where all steps are simple	solves problems with more than one step at least one of which is more complex	solves problems with a larger number of numeric steps, at least one of which is more complex

Reasoning	EYFS Statements drawn from CoEL, PSED, CL, L, M, UtW, EAD from 30 – 50 and 40 – 60+	Key Stage One (‘Phase A’)	Lower Key Stage Two (‘Phase B’)	Upper Key Stage Two (‘Phase C’)
Make connections	- uses talk to make links and notice patterns in their experiences - uses their experience to test their ideas and anticipate what might happen - comments and asks questions about aspects of their familiar world	- recognises similarities to previous work through classroom discussion - begins to use familiar elements of knowledge to tackle problems that are more unfamiliar or complex - poses ‘What if?’ questions during practical problem solving opportunities	- makes connections to previous work within mathematics and with other subjects - poses and answer questions that will help make sense of the problem - poses ‘What if?’ questions that may change the outcome or direction of the problem	- poses own questions and create problems for peers that are similar to ones worked on in class - develops own lines of enquiry
Evaluate	questions why things happened and gives explanations	reviews their work by explaining why they have done something	suggests refinements to elements of problem solving by comparing other approaches and against ‘modelled’ examples	considers efficiency of methods and adapts work accordingly throughout problem solving activities
Draw conclusions	- makes predictions and tests them e.g. <i>developing ideas of grouping, sequences, cause and effect</i> - answers ‘how and why’ questions about their experiences	- predicts an answer or outcome e.g. <i>numbers in an extended sequence</i> - talks about findings by referring to own work - explains why an answer is correct - begins to make simple inferences when referring to own work	- predicts conclusions and reason why when referring to work - comments on whether the conclusion was expected - makes valid inferences when referring to own work	- conjectures to develop own line of enquiry when testing outcomes - draws own valid conclusions and give an explanation of reasoning (including written explanations)

Generalise	- recognises similarities between learning experiences and begins to use this understanding in new contexts <i>realises not only objects, but anything can be counted, including steps, claps or jumps</i> - builds up vocabulary that reflects the breadth of their experiences to describe patterns and characteristics of the world around them	- understands a general statement by finding a particular example that match it - begins to describe a pattern or sequence in words or using concrete resources or own representation	- finds solutions and makes predictions by identifying patterns when working - forms generalised rules in words, using concrete resources or own representation	identifies more complex patterns and begins to express generalisations using symbolic notation
Justify	- uses talk to clarify thinking - talks about why things happen and how things work	provides simple reasons for opinions	justifies answers and solutions by referring to their work and support with examples	- justifies methods chosen and why the solution is the best one or not - supports conclusions with examples and counter examples

Problem solving strategies	EYFS Statements drawn from CoEL, PSED, CL, L, M, UtW, EAD from 30 – 50 and 40 – 60+	Key Stage One ('Phase A')	Lower Key Stage Two ('Phase B')	Upper Key Stage Two ('Phase C')
	- chooses ways to do things - checks how well their activities are going - notices patterns in their experiences - uses a range of ways to capture experiences - looks closely at similarities, differences, patterns and change - makes decisions about how to approach a task	- sorts information - uses 'guess and check' strategy to solve unfamiliar problems - begins to look for patterns in results while working and uses them to find other possible outcomes - draws simple pictures or diagrams - gives examples to match statements and ones that do not - finds a starting point	- identifies irrelevant information; uses lists and tables to identify and organise information - uses informed 'guess and check' - seeks a pattern - draws a diagram or model - seeks an exception - breaks the problem down into simpler steps - e.g. <i>works backwards</i>	- organises, deconstructs and prioritises information; uses systematic lists and tables to identify information - uses informed 'guess, check and improve' - identifies and uses a pattern - draws a mathematical model to support visualisation of problem - uses and applies negative proof (uses counter argument to prove the rule) - uses a structured approach to tackle the problem (devise a plan) - e.g. <i>works backwards</i> - solves a simpler related problem