

Algebra				
“For effective learning, algebraic thinking must be nurtured in parallel with arithmetic understanding” Lynn Arthur Steen	Pre-Algebra → Number Theory Solid understanding of Number Theory from Strand 3 Useful Methodology: Array Models, T&L on Integers, Fractions & Ratio 1	Understanding Variables → 	Algebra → Algebra skills seen as “generalised arithmetic”. Make an explicit association between symbols and numbers. Use array models and algebra tiles (drawings) to help misconceptions. 3	Extension “Most of the major principles of algebra and geometry emerge as generalisations of patterns in number and shape”
	Patterns Fostering ‘Algebraic Thinking’ through exposure to patterns, relationships, generalising and problem solving. 2	2 “Algebra provides finite ways of managing the infinite.” Variables can be used in 4 different ways: - A formula like $A = l \times b$ (infinite amount of possibilities) - A Law/Identity like the Commutative Law, $x + y = y + x$ (for all cases) - A Relationship/Rule like $\{(x, y) y = 2x + 3, x \in R\}$ (infinite amount of points that fit a rule) - An unknown like $2x = 6$ (one number from an infinite set of possibilities)	3 Money Box Problem extended: We can show adding like terms as part of a real-world problem solving question. For example: 2 family members combining their savings to buy a computer console costing €249 Skills for Solving Equations: After Money Box / Sunflowers Problem is used to explain an unknown in context of a real-world problem, extend this to teach the skills for solving equations. Methodology: T&L on Equations, stabilisers Solving Word Problems using Algebra: Show that algebra allows choice and flexibility in solving problems. Let students discover that algebra is often the most efficient way to solve a problem, especially word problems. Overview of the learning outcome for teaching algebra: <i>The relationship based approach to learning algebra should culminate in students having a deep understanding of algebra which allows easy movement between story, table, graph and equation. Learners should also have an appreciation that the power of algebra lies in its capacity to describe relationships for the purpose of problem solving.</i>	- Factorising - Construct some Perimeter and Area Formulae using patterns and variables - Discover theorems through patterns - Extend rise over run triangle into the formula for slope, then the distance between 2 points. Co-ordinate Geometry understood as the marriage of geometry and algebra. - Discover quadratic, cubic and exponential relationships through patterns - Look at patterns in Statistics - Discover Trigonometric Ratios through patterns - Investigate patterns of change in Periodic and Trigonometric functions - Rates of change observed in patterns can be extended to change at an instantaneous point in Calculus. - Extend patterns and symbols into Sequences and Series
	Functions Introduce the terms inputs, outputs, a mapping, domain and range. Money Box Problem $N \rightarrow N$, Sunflowers Question $N \rightarrow R$	Play “Guess the Rule” game.		- Formalise Functions

