LEVEL: Year 3	CONTENT: Number & Algebra	FOCUS: Pattern
In the Classroom		
PURPOSE	• Use materials to copy and continue a pattern • Record a pattern using numbers and symbols • Investigate number sequences • Identify rules or functions for number patterns • Use what is known about a pattern to predict missing or future terms	
WARM UP	**Watch the 1, 2, 3, Break it Down Clapping Game Video** Have students sit in the circle and join in with the patterns on the video – pause the video and ask students to name and demonstrate the pattern	
INTRODUCTION	Brief introduction to Good Mathematicians – make a list and place on the board, include teamwork, asking questions, sharing ideas, recording ideas, explaining thinking, persistence, checking solutions, working systematically and learning from mistakes.	
EXPLICIT TEACHING & LEARNING	**Investigating Patterns** Show students a pattern that has been created with square tiles. Challenge students to copy and continue the pattern and use this information to predict future terms. Allow time for students to investigate the pattern, encouraging the use of symbols – during sharing, if no student has suggested it, model the use of a table to help predict terms and identify the rule or function for the pattern **Challenge** Provide students with additional patterns to try and unpack, model and continue	
DISCUSSION/KEY QUESTIONS	• Can you describe your pattern? • What comes next in the pattern? • How could we record these patterns in our books? • Instead of using symbols, how else could we record the patterns in our books? • If we create a table, could this help us see what is happening with the pattern? • What is the rule or function for this pattern? • Can we use this information to predict future terms?	
DELIBERATIVE PRACTICE	The focus of this activity is to discover if students can use numbers to describe a pattern created with objects. We want to encourage students to record what they know about the pattern in a table and then use this information to help predict future terms and identify the rule or function for the pattern. At this stage, the rule may be described using familiar language (rather than symbolically), e.g. double and add 1 rather than 2n + 1.	
REFLECTION	Reflect on how using a table can help us analyse what is happening with the numbers. From here we can look for patterns, develop a rule and predict future terms. Also reflect as a class on students who were a Good Mathematician and why – have students nominate one another. Remind students of list created at the beginning of the lesson.	
RESOURCES	Square tiles or unifix blocks 1cm x 1cm grid paper Fair and Square – NZMaths Figure it Out Series https://nzmaths.co.nz/sites/default/files/FairandSquare.pdf 1, 2, 3, Break it Down Clapping Game YouTube video https://www.youtube.com/watch?v=_ICDWs7lnfI	
Curriculum Connections		
CONTENT	**NSW Syllabus Mathematics K-10 – Stage 2.1** **Patterns & Algebra 1** Describe, continue and create number patterns resulting from performing addition or subtraction (ACMNA060) • identify and describe patterns when counting forwards or backwards by threes, fours, sixes, sevens, eights and nines from any starting point • model, describe and then record number patterns using diagrams, words or symbols	

	• ask questions about how number patterns have been created and how they can be continued (Communicating) • create and continue a variety of number patterns that increase or decrease, and describe them in more than one way Investigate the conditions required for a number to be even or odd and identify even and odd numbers(ACMNA051) • model even and odd numbers of up to two digits using arrays with two rows • compare and describe the difference between models of even numbers and models of odd numbers (Communicating) • recognise the connection between even numbers and the multiplication facts for two (Reasoning) • describe and generalise the conditions for a number to be even or odd • recognise the significance of the final digit of a whole number in determining whether a given number is even or odd (Reasoning) • identify even or odd numbers of up to four digits
WHAT CAME BEFORE	Students will be familiar with creating and identifying repeating patterns with objects and in number sequences but may need assistance with using numbers to describe what is happening with an object pattern.
WHAT COMES NEXT	By creating a table to analyse what is happening in a pattern will help students begin to make generalisations about patterns. This will further support students' ability to identify the 'function' or 'rule' of the pattern. The process encourages not just prediction, but justification with proof about what is happening. These are important steps in becoming a good mathematician.
VOCABULARY	Repeating pattern, growing pattern, next, before, after, ordinal numbers, first, second, last, copy, continue, create, explain, unit of repeat, objects, rule or function of the pattern (e.g. 2, 4, 6, 8 the function is add 2 or + 2), skip counting, table, analyse, systematic, odd and even numbers.
MISCONCEPTIONS	Some students may make prediction about what is happening in the pattern based only on the first 2 terms in the sequence, e.g. 2, 4 the rule could be add 2 or it could be doubling, students will therefore need to predict what the rule for the pattern is, then check to see if their prediction holds.
WHAT PROFICIENCIES ARE TO BE UTILISED? **Understanding** **Fluency** **Problem Solving** **Reasoning** **Communicating (NSW)** **Justifying (NSW)**	**Year 3 (Australian Curriculum)** **Understanding** includes connecting number representations with number sequences, partitioning and combining numbers flexibly, representing unit fractions, using appropriate language to communicate times, and identifying environmental symmetry **Fluency** includes recalling multiplication facts, using familiar metric units to order and compare objects, identifying and describing outcomes of chance experiments, interpreting maps and communicating positions **Problem-solving** includes formulating and modelling authentic situations involving planning methods of data collection and representation, making models of three-dimensional objects and using number properties to continue number patterns **Reasoning** includes using generalising from number properties and results of calculations, comparing angles and creating and interpreting variations in the results of data collections and data displays. **NSW Syllabus Mathematics K-10 – Stage 2.1 Outcomes** • uses appropriate terminology to describe, and symbols to represent, mathematical ideas • selects and uses appropriate mental or written strategies, or technology, to solve problems • checks the accuracy of a statement and explains the reasoning used • generalises properties of odd and even numbers, generates number patterns, and completes simple number sentences by calculating missing values
ASSESSMENT	Ask students to use numbers and symbols to record and continue the pattern in their books. Students are encouraged to create a table to show what is happening with the pattern and then use this information to find out the rule or function for the pattern.