


LEVEL: Year 6	CONTENT: Number & Algebra	FOCUS: Patterns & Algebra
In the Classroom		
<p>PURPOSE</p>	<ul style="list-style-type: none"> Identify the qualities and behaviours of a good mathematician Choose an appropriate strategy to attempt an unfamiliar problem Explain the strategy used to solve the problem Recognise and continue number patterns Record solutions using a systematic approach Interpret data and identify patterns Develop rules to describe number sequences Use symbols to record and explain rules 	
<p>INTRODUCTION</p>	<p>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, learning from mistakes and believing in yourself.</p>	
<p>EXPLICIT TEACHING & LEARNING</p>	<p>The Frog Challenge</p>  <p>Present students with the 3 frogs challenge. Moving forwards only using slides (move to the next space) or jumps (jump over one frog to the next vacant space) the three green frogs must move to the 3 right lily pads and the 3 brown frogs must move to the 3 left lily pads using the least amount of moves possible. Model the problem with the whole class using 6 students and 7 chairs. Encourage students to find a way to record the total number of moves. If students are having trouble, encourage them to move to a simpler problem. After beginning with the whole class allow students to work in smaller groups to tackle the problem before sharing any discoveries made.</p> <p>Challenge Can students use a table to record the solution and develop a rule for what is happening?</p>	
<p>DISCUSSION/KEY QUESTIONS</p>	<ul style="list-style-type: none"> What do you know about this problem? How could you start this problem? Can you explain the strategy you are using? Could we try a simpler problem? How could you record the solution? Could a table help? Do you notice any patterns? Can you use this information to predict future solutions? How can you demonstrate that all your solutions are correct? Can you develop a rule to describe the number sequence? Can you use what you have discovered to find all possible solutions? 	
<p>DELIBERATIVE PRACTICE</p>	<p>This activity is designed to encourage students to engage with a problem, before they over think it. Too often in class we begin with what is familiar to students and gradually increase the challenge. This problem begins with a challenge and encourages students to work backwards to solve a simpler problem, before applying what they know to solve even more challenging problems.</p>	
<p>REFLECTION</p>	<p>Students share solutions and strategies with the class; What did they discover? What worked well? What would they do differently next time? Recap the strategies and behaviours good mathematicians use, ask students to nominate someone they saw being a good mathematician and explain which strategy or behaviour they were demonstrating.</p>	
<p>RESOURCES</p>	<p>Counters</p>	

Curriculum Connections	
CONTENT	<p>VICTORIAN CURRICULUM F-10 (YEAR 6)</p> <p>Number & Place value Identify and describe properties of prime, composite, square and triangular numbers (VCMNA208) Elaborations: understand that some numbers have special properties and that these properties can be used to solve problems</p> <p>Patterns & Algebra Continue and create sequences involving whole numbers, fractions and decimals. Describe the rule used to create the sequence (VCMNA219) Elaborations: identify and generalise number patterns; investigate additive and multiplicative patterns such as the number of tiles in a geometric pattern, or the number of dots or other shapes in successive repeats of a strip or border pattern looking for patterns in the way the numbers increase/decrease</p> <p>Data representation & interpretation Construct, interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables (VCMSP235) Elaborations: compare different student-generated diagrams, tables and graphs, describing their similarities and differences and commenting on the usefulness of each representation for interpreting the data; understand that data can be represented in different ways, sometimes with one symbol representing more than one piece of data, and that it is important to read all information about a representation before making judgments</p>
WHAT CAME BEFORE	In Literacy, students will often have a process to follow for writing: plan, draft, revise and edit. In Maths, many students will not follow the same process and may tackle problems without a clear plan in place. This problem is designed to encourage students to begin with a challenging problem, try a simpler problem, look for patterns, then return to the original problem.
WHAT COMES NEXT	Recording the solutions in a table will assist students to look for patterns. Students need to begin to move beyond simply noticing patterns to begin developing rules to describe these patterns. Are students to use symbols (algebra) to explain and record the rule for the pattern?
VOCABULARY	Jump, slide, move, tally, table, interpret, systematic, recording, symbols, patterns, sequence, rule
MISCONCEPTIONS	Students will need to remember that the frog is unable to move backwards. They will also need to develop a workable strategy to record what is happening to keep track of the pattern and identify the rule.
WHAT PROFICIENCIES ARE TO BE UTILISED? Understanding Fluency Problem Solving Reasoning Communicating (NSW) Justifying (NSW)	<p>Year 6 (Australian Curriculum)</p> <p>Understanding includes describing properties of different sets of numbers, using fractions and decimals to describe probabilities, representing fractions and decimals in various ways and describing connections between them, and making reasonable estimations</p> <p>Fluency includes representing integers on a number line, calculating simple percentages, using brackets appropriately, converting between fractions and decimals, using operations with fractions, decimals and percentages, measuring using metric units and interpreting timetables</p> <p>Problem-solving includes formulating and solving authentic problems using fractions, decimals, percentages and measurements, interpreting secondary data displays and finding the size of unknown angles</p> <p>Reasoning includes explaining mental strategies for performing calculations, describing results for continuing number sequences, explaining the transformation of one shape into another and explaining why the actual results of chance experiments may differ from expected results.</p>

ASSESSMENT	This task could be used as a Rich Task to assess students' knowledge of number patterns and ability to record information using a systematic approach. This rubric could be used to assess students' knowledge and strategies.	
	SCORE	EXPECTATION
	0	Students has difficulty beginning the task independently. Needs assistance and prompting to begin. Uses trial and error to approach the task, but has no method of tracking what they have done. Relies on teacher and other students for assistance and is unable to communicate their strategy.
	1	Student can begin the task. Uses trial and error to begin the task and is beginning to learn from mistakes in order to refine the process. Needs prompting to record the steps involved to solve the problem. Once shown can record some possible solutions, but approach is not systematic. Works alongside other students and needs prompting to explain strategy.
	2	Students begins task without prompting. Uses trial and error to begin task and identifies processes that will or will not work. Records possible solutions and is beginning to identify and explain possible patterns. Works with other students to identify rules that describe the number sequences.
3	Student expresses confidence with task. After some initial trial and error develops a system for finding and recording possible solutions using a systematic approach. Shares solutions with other students, identifies patterns in the data and uses this information to make predictions about the other possible solutions. Student demonstrates a strong grasp of number patterns and is able to describe the rule for each number sequence and use symbols to record a possible rule.	