LEVEL: Year 3	CONTENT: Number & Algebra	FOCUS: Addition
In the Classroom		
PURPOSE	- Use efficient strategies to find the total of three dice - Recall and apply addition facts - Identify and continue number patterns resulting from addition - Record solutions using a systematic approach - Interpret data and report the results	
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, learning from mistakes and believing in yourself.	
EXPLICIT TEACHING & LEARNING	**Add 3 Dice** Ask students to work in pairs. Place three dice in a row. Find a way to turn each one so that the three numbers on top of the dice total the same as the three numbers on the front of the dice. Think of a way to record your solutions. **Challenge** Can you find all the possible solutions? How can you prove that you are correct?	
DISCUSSION/KEY QUESTIONS	- What do you know about this problem? - Can you find a solution when using 2-dice? What about 3-dice? - What strategies can help you add the total of the 3-dice? - Does it matter in what order you add the dice? - What is the most efficient way to add the dice? - Can you combine two of the numbers then count on? - Can skip counting or multiplication facts help you? - What other strategies could you use? - What is the lowest solution you could find? What is the highest? - How could you record the possible solutions? - How can you demonstrate that all your solutions are unique? - Could a table help? - Do you notice any patterns? - Can you use what you have discovered to find all the solutions? - How can you check that no other solutions are possible?	
DELIBERATIVE PRACTICE	This activity is designed to see if students are able to apply their addition strategies in order to find multiple solutions to a problem. Often students will have a method for solving an addition problem when it is written as an equation, but when presented with a more open-style problem they revert to less efficient methods.	
REFLECTION	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.	
RESOURCES	A large collection of 6-sided dice (each pair of students will need 3 dice) **Add Three Dice** https://nrich.maths.org/1016	
Curriculum Connections		
CONTENT	**VICTORIAN CURRICULUM F-10 (YEAR 3)** **Number & Place Value** Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation(VCMNA133) **Elaborations:** Recognise that certain single-digit number combinations always result in the same answer for addition and subtraction, and using this knowledge for addition and subtraction of larger numbers; Extend strategies for addition and subtraction such as 14 + 8 + 6 = 14 + 6 + 8 = 28 and 54 – 28 = 2 + 20 + 4; Combine knowledge of addition and subtraction facts and partitioning to aid computation. For example, 57 + 19 = 57 + 20 – 1 **Patterns & Algebra** Describe, continue, and create number patterns resulting from performing addition or subtraction(VCMNA138)	

	Elaborations: Identify and writing the rules for number patterns; Describe a rule for a number pattern, then creating the pattern

Data representation & interpretation
Collect data, organise into categories and create displays using lists, tables, picture graphs and simple column graphs, with and without the use of digital technologies (VCMSP149)
Elaborations: Explore meaningful and increasingly efficient ways to record data, and representing and reporting the results of investigations |
WHAT CAME BEFORE	Students are often able to recall addition facts for adding two numbers, e.g. 5 and 3 is 8, but for this task students will need to apply this knowledge to add 3 numbers. Remind students about efficient strategies and check to see if students are falling back on counting all or counting on to solve problems.
WHAT COMES NEXT	Recording all the possible solutions in a table will assist students to look for patterns. How many solutions are there for 2-dice? How many solutions for 3-dice? How do we know we have them all? Is there are pattern in the solutions? For example, are there more solutions that add up to 9 than say 11? Can we use what we have discovered to predict the total number of solutions? Could we use this information to find possible solutions for 4-dice?
VOCABULARY	Add, combine, count, total, commutativity, combination, pattern, rotate, turn, re-order, display, table, interpret, analyse, predict, discover, record, explain, systematic
MISCONCEPTIONS	Students may think that if they simple change the position of the dice that this will create a new solution. Students may also need to develop a system for distinguishing between possible solutions.
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. |

	SCORE	EXPECTATION
ASSESSMENT		This task could be used as a Rich Task to assess students' knowledge of addition strategies and ability to record information using a systematic approach. This rubric could be used to assess students' knowledge and strategies.
	0	Students has difficulty beginning the task independently. Needs assistance and prompting to begin. Uses basic strategies, such as counting all to find the total of the three dice. Relies on teacher and other students for assistance and is unable to communicate their strategy.
	1	Student can begin the task. Uses simple strategies, such as counting on and fingers to find the total of the three dice. Needs prompting to find the total of the top three numbers and the front three numbers. Once shown can record some possible solutions, but approach is not systematic. Works alongside other students and needs prompting in order to explain strategy.
	2	Students begins task without prompting. Demonstrates knowledge of number facts to find possible solutions. Records possible solutions and is beginning to identify and explain possible patterns. Works with other students to investigate additional solutions.
	3	Student expresses confidence with task. After some initial trial and error develops a system for finding and recording possible totals using a systematic approach. Shares solutions with other students, identifies patterns in the data and uses this information to make predictions about the total number of solutions. Student demonstrates a strong grasp of number facts and can quickly find the total of the three dice, using a range of methods, such as building on known facts, doubles, skip counting and knowledge of multiplication facts.