LEVEL: Year 5	CONTENT: Problem Solving	FOCUS: Reasoning
In the Classroom		
PURPOSE	• Identify the qualities of a good mathematician • Demonstrate the qualities of a good mathematician • Recognise and provide a definition for perimeter • Identify the relationship between the perimeter and the dimension of different rectangles • Explain the definition for area • Calculate the area of different rectangles • Identify and use the standard units for perimeter and area • Use a systematic approach to find the solution to the problem • Share ideas with others and justify approach • Listen to the ideas of others and build upon their suggestions	
INTRODUCTION	**Good Mathematicians** Brief discussion about the qualities of good mathematicians - remind students that everyone is a good mathematician and encourage students to use strategies, including asking questions, sharing ideas, learning from mistakes, being systematic, persistence, recording thinking, explaining thinking, checking solutions and believing in yourself.	
EXPLICIT TEACHING & LEARNING	**Peter's String** Peter has a piece of string 36cm long. He plays around with it to create different rectangles. He thinks that all the rectangles have the same area. His sister, Miri, disagrees. Who is right and why? **Challenge** – Peter thinks that the rectangle he can make with the biggest area will be a square. His sister, Miri, disagrees. Who is right and why?	
DISCUSSION/KEY QUESTIONS	• What do you know about this problem? • What will be the perimeter of the rectangles? • How many different rectangles can you find? • Are all your rectangles different? (rotations/reflections) • What are the dimensions of each of these rectangles? • How do you find the areas? • Are the perimeters and areas equal? • What is the relationship between the perimeter and area of rectangles? • What is the definition for perimeter and area? • What is the standard unit for perimeter and area? • How can you show you have found all the possible solutions?	
DELIBERATIVE PRACTICE	The focus of this activity is for students to recognise the relationship between the dimensions of a square or rectangle and the perimeter and area of these shapes. Students will need to use a systematic approach to show that they have found all the possible solutions.	
REFLECTION	Students share the methods used to find and investigate all the possible rectangles. Also talk about the standard units and the relationship between the dimension of the rectangles and perimeter and area. Also discuss the ways students demonstrated that they were a Good Mathematician	
RESOURCES	**NZMaths problem – Peter's string** https://nzmaths.co.nz/resource/peters-string 1cm grid paper, plain A4 paper, 30 cm rulers, string and scissors	
Curriculum Connections		
CONTENT	**VICTORIAN CURRICULUM F-10: YEAR 5** **Using units of measurements** Choose appropriate units of measurement for length, area, volume, capacity and mass (VCMMG195) **Elaborations:** recognise that some units of measurement are better suited for some tasks than others Calculate the perimeter and area of rectangles and the volume and capacity of prisms using familiar metric units (VCMMG196) **Elaborations:** explore efficient ways of calculating the perimeters of rectangles such as adding the length and width together and doubling the result; explore efficient ways of finding the areas of rectangles	

WHAT CAME BEFORE	Students will be familiar with length, but often get stuck with the definition that "length is how long something is." This definition may not help students make connections between the perimeter of a rectangle and its other dimensions, i.e. its length, width and area.
WHAT COMES NEXT	Students may choose to use the gird paper provided to count the squares in order to find the dimensions of the different rectangles. Gradually, we want students to move beyond this and begin using calculations in order to find all the possible rectangles and their related dimensions.
VOCABULARY	Length, width, perimeter, area, dimension, square, rectangle, standard units, metres, centimetres, square centimetres (cm²), difference, rotation, reflection, regular shape, irregular shape
MISCONCEPTIONS	Students sometimes mix up measurement terms, including length, width, perimeter and area. It will be important to clarify these before investigating the problem further.
WHAT PROFICIENCIES ARE TO BE UTILISED? **Understanding** **Fluency** **Problem Solving** **Reasoning**	**Year 5 (Australian Curriculum)** **Understanding** includes making connections between representations of numbers, using fractions to represent probabilities, comparing and ordering fractions and decimals and representing them in various ways, describing transformations and identifying line and rotational symmetry **Fluency** includes choosing appropriate units of measurement for calculation of perimeter and area, using estimation to check the reasonableness of answers to calculations and using instruments to measure angles **Problem-solving** includes formulating and solving authentic problems using whole numbers and measurements and creating financial plans **Reasoning** includes investigating strategies to perform calculations efficiently, continuing patterns involving fractions and decimals, interpreting results of chance experiments, posing appropriate questions for data investigations and interpreting data sets.
ASSESSMENT	**Exit Pass –** David draws a rectangle with an area of 24 cm² - what might be the dimensions of the rectangle? Show and explain your thinking.