LEVEL: Junior Primary	CONTENT: Problem Solving	FOCUS: 2D shapes
In the Classroom		
PURPOSE	• Identify the qualities of a good mathematician • Read numbers written on the board • Apply number knowledge to say the correct number, for example, say the number that is one more than the number on the board • Identify and name familiar two-dimensional shapes • Identify the properties of two-dimensional shapes, including sides and corners • Explain and develop a definition for a side or a corner • Use shape blocks to create new shapes • Check solution by identifying and explaining properties of the shape • Explain why a solution is or is not correct	
WARM UP	**Good Mathematicians** Speak to the students about the qualities of a good mathematicians. Brainstorm a list on the board that includes asking questions, working together, learning from mistakes, persistence, checking, explaining thinking and believing in yourself.	
INTRODUCTION	**The Number 6** Explain to students that your favourite number is the number 6. You wore number 6 when playing basketball, etc. Knowing this information ask the students to predict which one of the pattern blocks is your favourite and why. Eventually a student will identify the hexagon as your favourite as it has 6 sides and 6 corners. Make sure you have the student identify what they mean by corners and sides by running their finger along the shape or pointing to the corners and using familiar words to develop a simple definition.	
EXPLICIT TEACHING & LEARNING	**Making and Checking** Explain to the students that you want to make as many hexagons as possible. Challenge the students to demonstrate ways to make hexagons using the other shapes in the Pattern Blocks set. Encourage the students to check that the shape they have made is a hexagon. Does it have 6 sides? Does it have 6 corners? Challenge the students to work together to make even larger designs. Take photos of examples and non-examples to use during reflection.	
DISCUSSION/KEY QUESTIONS	• What are the shapes in the pattern block set? • How can you describe these shapes? • What is a side? What is a corner? • Can you explain what is a side/corner? • What is a hexagon? • Can you use these shapes to create hexagons? • Can you explain how you know the pattern/shape you have created is a hexagon? • Can you explain why this shape is not a hexagon?	
DELIBERATIVE PRACTICE	The focus of this activity is to encourage students to check their shape to ensure/prove that it is a hexagon. Students need to develop an understanding that good mathematicians find solutions to problems, check to see if their solution is correct and explain their thinking.	
REFLECTION	Show students some examples and non-examples of the designs they have created. Encourage students to explain their thinking. Brief discussion with students about WWW and EBI regarding the task. This should lead into a discussion about the power of having a positive mindset, learning from each other and working together to achieve a task.	
RESOURCES	Pattern blocks – more than one tub; camera (iPhone) to take photos of some of the designs	

CHOOSEMATHS

Curriculum Connections	
CONTENT	**AUSTRALIAN CURRCIULUM F-10** **FOUNDATION** Sort, describe and name familiar two-dimensional shapes and three-dimensional objects in the environment (ACMMG009**)** **Elaborations:** Sort and describe squares, circles, triangles, rectangles, spheres and cubes **NSW SYLLABUS – EARLY STAGE 1** **TWO-DIMENSIONAL SPACE** Sort, describe and name familiar two-dimensional shapes in the environment (ACMMG009) • Identify, represent and name circles, triangles, squares and rectangles presented in different orientations, e.g. identify circles, triangles, squares and rectangles in pictures and the environment, including in Aboriginal art (Problem Solving) • Ask and respond to questions that help identify a particular shape (Communicating, Problem Solving) • Sort two-dimensional shapes according to features such as size and shape • Recognise and explain how a group of two-dimensional shapes has been sorted (Communicating, Reasoning) • Manipulate circles, triangles, squares and rectangles, and describe their features using everyday language, e.g. 'A square has four sides' • Make pictures and designs using a selection of shapes, e.g. make a house from a square and a triangle (Communicating) • Identify and draw straight and curved lines
WHAT CAME BEFORE	Many students arrive at school with a basic understanding of shapes. They will be able to name familiar shapes, such as squares, triangles and circles and may name basic properties, such as sides. Students will often have issues when the orientation of a shape is changed. They may now call the shape an "upside down triangle." Students may also know the names of shape properties but may not really have a clear definition of what that property is, for example, a circle does not have any sides. In maths a side is a straight line, so we say circles have curves.
WHAT COMES NEXT	Students need to apply their knowledge of 2D shapes in order to identify how 3D shapes are created. Providing students with access to range of shapes with different orientations will help to avoid common misconceptions, like a square rotated 45 degrees becomes a diamond. Do not only show students posters and BLMs with standard orientations. A diamond could be a square, a rhombus or possibly a kite.
VOCABULARY	2D, two-dimensional, sides, corners, straight, line, curves properties, features, explain, justify, example, non-example, square, rhombus, trapezium, triangle, hexagon, not a diamond
MISCONCEPTIONS	Some students may know the terms sides and corners, but may not be able to explain what these properties are or identify how many of each property is on a particular shape. Avoid the word diamond – in mathematics we call that shape a rhombus (the blue shape in the pattern block is a rhombus)
WHAT PROFICIENCIES ARE TO BE UTILISED? **Understanding** **Fluency** **Problem Solving** **Reasoning** **Communicating (NSW)** **Justifying (NSW)**	**Foundation Level (Australian Curriculum)** **Understanding** includes connecting names, numerals and quantities **Fluency** includes readily counting numbers in sequences, continuing patterns and comparing the lengths of objects **Problem-solving** includes using materials to model authentic problems, sorting objects, using familiar counting sequences to solve unfamiliar problems and discussing the reasonableness of the answer **Reasoning** includes explaining comparisons of quantities, creating patterns and explaining processes for indirect comparison of length **NSW Syllabus – Early Stage 1 Outcomes** • describes mathematical situations using everyday language, actions, materials and informal recordings • uses objects, actions, technology and/or trial and error to explore mathematical problems • uses concrete materials and/or pictorial representations to support conclusions • manipulates, sorts and describes representations of two-dimensional shapes, including circles, triangles, squares and rectangles, using everyday language
ASSESSMENT	Rather than assessing students this task is more about a discussion about strategies, what is working, what wasn't working, what did you do when you got stuck, etc.

CHOOSE**MATHS**