

<b>LEVEL:</b> Upper Primary	<b>CONTENT:</b> Statistics & Probability	<b>FOCUS:</b> Mean, Median and Mode
<b>In the Classroom</b>		
<b>PURPOSE</b>	<ul style="list-style-type: none"> <li>Identify the qualities of a good mathematician</li> <li>Demonstrate the qualities of a good mathematician</li> <li>Explain and record thinking using a systematic approach</li> <li>Recognise and explain ways to measure data, including mean, median and mode</li> <li>Use materials and tools to help measure heights</li> <li>Compare measurements and make statements about the data</li> <li>Understand that a measurement, such as average, may not represent the height of any individual</li> </ul>	
<b>INTRODUCTION</b>	<p><b>Good Mathematician</b> Brief discussion about the qualities of good mathematicians - remind students that everyone is a good mathematician and encourage students to use the strategies that they have suggested</p>	
<b>WARM UP</b>	<p><b>What is the average height in this class?</b> Teacher poses the question, 'What is the average height in this class?' The teacher then asks, 'What does average mean?' The students brainstorm definitions of average. At the end of the discussion definitions of mean, median and mode are displayed (or written into students' journals). The teacher poses the question to the students, 'How might we find out the "average" height of our class?' Students brainstorm methods for collecting data to answer this question effectively.</p>	
<b>EXPLICIT TEACHING &amp; LEARNING</b>	<p><b>Finding the Average</b> In pairs, the students use a tape measure and streamer to measure the height of their partner. Students may either measure using the tape measure and cut the right length from the streamer or match the streamer to the height of the student and measure the streamer length afterwards. The height and name of the student is recorded on the streamer. In a large open area, the students organise the streamers to be laid on the floor in order of height. The teacher and students gather around the streamers. The small group of streamers are used to model the different meanings of average discussed in the introduction. In the case of mean, the teacher demonstrates how you might take a piece off the end of a longer streamer and add it to a shorter stream to create two streamers of the same length, thus finding the mean average of two streamers/height. Student data is now transferred to the board in descending order. The teacher asks the students to work in pairs or a small group to find the mean, median and mode of the height of the class. The students may use calculators if required. Teacher models using Excel to check the calculations.</p>	
<b>DISCUSSION/KEY QUESTIONS</b>	<ul style="list-style-type: none"> <li>What are the different ways we measure data?</li> <li>When are these different measures used?</li> <li>What is the mean, median and mode?</li> <li>How do we calculate the range?</li> <li>How are the different measures calculated?</li> <li>What tools can help us to calculate the mean?</li> <li>How can we interpret the data?</li> <li>How does this information help us?</li> <li>What are outliers?</li> </ul>	
<b>DELIBERATIVE PRACTICE</b>	<p>The focus of this activity is for students to have a tactile experience to help build on their understanding of average. Average makes all the streamers the same length, but is anyone in the class in fact of average height?</p>	
<b>REFLECTION</b>	<p>Discussion with students about the ways they demonstrated that they were a Good Mathematician</p>	
<b>RESOURCES</b>	<p>Tape measures, streamers, coloured markers, calculators and Excel  <b>Measures of Central Tendency</b>  <a href="https://statistics.laerd.com/statistical-guides/measures-central-tendency-mean-mode-median.php">https://statistics.laerd.com/statistical-guides/measures-central-tendency-mean-mode-median.php</a>  <b>Average Height of Class</b>  <a href="http://www.education.vic.gov.au/Documents/school/teachers/teachingresources/discipline/maths/ttavghighclass.pdf">http://www.education.vic.gov.au/Documents/school/teachers/teachingresources/discipline/maths/ttavghighclass.pdf</a></p>	

Curriculum Connections	
<b>CONTENT</b>	<b>NSW SYLLABUS – STAGE 3</b> Investigate combinations of translations, reflections and rotations, with and without the use of digital technologies (ACMMG142)
<b>WHAT CAME BEFORE</b>	The focus of this problem shifts from merely finding possible solutions but being able to demonstrate and explain a systematic strategy. Students may be able to find possible solution, but are they able to explain their reasoning, and support this with evidence.
<b>WHAT COMES NEXT</b>	As students become more familiar with problem solving they should begin to pose and solve their own problems. In this example, for the 4 x 4 grid what pathways between peg A and other pegs are possible, which pathways are not. Is there a pattern to these pathways? What if you had a 5 x 5 grid?
<b>VOCABULARY</b>	Systematic, path, pathway, location words, vertical, horizontal, left, right, shape transformation, flip, slide, turn, reflect, rotate, translate, prove, justify, efficient
<b>MISCONCEPTIONS</b>	Students may have trouble using location words to distinguish between different solutions.
<b>WHAT PROFICIENCIES ARE TO BE UTILISED?</b>  Understanding Fluency Problem Solving Reasoning Communicating (NSW) Justifying (NSW)	<b>Year 6 (Australian Curriculum)</b> <b>Understanding</b> 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 <b>Fluency</b> 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 <b>Problem-solving</b> includes formulating and solving authentic problems using fractions, decimals, percentages and measurements, interpreting secondary data displays and finding the size of unknown angles <b>Reasoning</b> 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. <b>NSW Syllabus – Year 6 Outcomes</b> <ul style="list-style-type: none"> <li>describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions</li> <li>selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations</li> </ul>
<b>ASSESSMENT</b>	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.