

## Appendix D.2

### Numeracy scenario: Logging mill

Jeff works in logging mill with a machine that cuts boards to 3000mm (3 m) lengths. As a quality assurance measure, three boards are measured in the morning and three in the afternoon. The boards are chosen by taking every 10<sup>th</sup> board from a randomly selected starting point. The average of the 3 boards is checked to make sure the average falls within the tolerance range of 2995 to 3005 mm.

Problem	Underpinning ideas	Teaching Points
Measure length of 3 randomly selected boards	<ul style="list-style-type: none"> <li>• Sample selection <b>Step 6 interpreting data</b></li> <li>• Sense of 1mm, 10 mm and sense of length measured in mm <b>Measurement step 4</b></li> <li>• Measuring accurately and why <b>Measurement step 5</b></li> </ul>	<ol style="list-style-type: none"> <li>1. What is random sample/why randomness?</li> <li>2. Benchmark for mm (what does 10, 100, 1000, 2000, 3000, look like?)</li> <li>3. Accurate estimating of measurement</li> <li>4. Make sure measuring instrument at 0</li> <li>5. Reading in mm on measuring instrument</li> <li>6. Degree of accuracy</li> </ol>
Average the three lengths	<ul style="list-style-type: none"> <li>• Which 'average' is appropriate (mean, median) and why</li> <li>• How to calculate mean <b>Step 6 analysing data</b></li> <li>• Estimate sum of the 3 lengths and use calculator or mental strategy to find exact answer <b>Step 4 additive strategies</b></li> </ul>	<ol style="list-style-type: none"> <li>1. Why use mean and not median?</li> <li>2. To find a mean you add the lengths and divide by the number of lengths</li> <li>3. If you are using a calculator estimate the answer first and check reasonableness of calculator answer</li> </ol> <p>Discuss possible mental strategies</p> <p>For example for sum:</p>

	<ul style="list-style-type: none"> <li>Estimate sum divided by 3 and use calculator or mental strategy to find exact answer</li> </ul> <p>Step 4 multiplicative</p> <ul style="list-style-type: none"> <li>Know that average is reasonable (i.e., somewhere between the original 3 measurements)</li> </ul> <p>Step 6 analysing data</p>	$3001 + 3002 + 3003 = 9000 + 1 + 2 + 3 = 9006$ $2995 + 3003 + 3004 = 5\text{mm under } 3000 \text{ and } 7\text{mm over } 3000 \text{ gives } 2 \text{ mm over so answer is } 9002 \text{ mm}$  For example for division: $9006 \div 3 = 9000 \div 3 \text{ and } 6 \div 3 = 3002$  4. Discuss why the average must lie between the biggest and smallest measurement.
Decide whether the average calculated is within tolerance range (eg., 2995 – 3005)	<ul style="list-style-type: none"> <li>Make a judgement about numbers.</li> </ul> <p>Step 4 number sequencing</p> <ul style="list-style-type: none"> <li>Take appropriate action.</li> </ul>	1. Does calculation fit within tolerance range? 2. Recalibrate machine or not?