

# Planning Guide

## Advanced Additive to Advanced Multiplicative

### Book 2

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### Ratios and Proportions

*Note: All of the units from the 2006 and 2007 version of Teaching Addition, Subtraction and Place Value Book 5 that apply to adding and subtracting decimals have been included.*

Strategy	Numeracy Book reference	Unit in this book	Page
Rename improper fractions as mixed numbers using division, and position improper fractions on a number line.	<i>Teaching Number Sense and Algebraic Thinking (Book 8)</i> Fractions Greater Than 1	<b>1 - Fractions greater than 1</b>  <i>We are learning to convert mixed fractions into common fractions and vice versa.</i>	18 to 21
Position common fractions on a number line.	<i>Teaching Number Sense and Algebraic Thinking (Book 8)</i> Fraction Number Lines	<b>2 - Fractions on a number line</b>  <i>We are learning to show common fractions and mixed fractions on a number line.</i>	22 to 23
Order fractions using equivalence and benchmarks, e.g. $\frac{2}{5} > \frac{7}{16}$ because $\frac{2}{5}$ is $\frac{1}{10}$ less than $\frac{1}{2}$ and $\frac{7}{16}$ is $\frac{1}{16}$ less.	<i>Teaching Number Sense and Algebraic Thinking (Book 8)</i> Estimating with Fractions  Fractions	<b>3 - Ordering fractions and estimating with fractions</b> <i>We are using our number sense to estimate answers when adding and subtracting fractions.</i>  <i>We are using our number sense to order fractions.</i>  <i>We are learning to order fractions.</i>	24 to 25  26  27 to 29
Find equivalent fractions by splitting, e.g. $\frac{3}{4} = \frac{15}{20}$ , by splitting each quarter into fifths.	<i>Teaching Number Sense and Algebraic Thinking (Book 8)</i> Equivalent Fractions	<b>4 - Equivalent fractions</b>  <i>We are learning to convert a fraction into any equivalent fraction.</i>	30 to 35
Add and subtract fractions with related denominators, e.g. $\frac{3}{4} + \frac{5}{12} = \frac{14}{12} = 1\frac{2}{12}$ .	<i>No specific Numeracy Book reference</i>	<b>5 - Adding and subtracting fractions</b>  <i>We are learning to add and subtract fractions with the same or related denominators.</i>	36 to 37

# Multiplication and Division

Strategy	Numeracy Book reference	Unit in this book	Page
<p>Find fractions of whole number amounts using multiplication and division.</p> <p>Find fractions of lengths, areas, volumes and other continuous quantities using reunitising.</p>	<p><i>Teaching Number Sense and Algebraic Thinking (Book 8)</i></p> <p>Fractions Times Whole Numbers</p> <p>Whole Numbers Times Fractions</p>	<p><b>6 - Fractions of whole numbers</b></p> <p><i>We are learning to find fractions of whole numbers</i> (Introduction to unit 7)</p> <p><b>7 - Multiplying whole numbers and fractions</b></p> <p><i>We are learning to multiply fractions by whole numbers.</i></p> <p><i>We are learning to multiply whole numbers by fractions.</i></p>	<p>38 to 43</p> <p>44 to 45</p> <p>45 to 47</p>
<p>Multiply fractions by other fractions, e.g. <math>\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}</math></p> <p>Find fractions of lengths, areas, volumes and other continuous quantities using reunitising, e.g. three quarters of one half is three eighths.</p>	<p><i>Teaching Number Sense and Algebraic Thinking (Book 8)</i></p> <p>A Fraction Times a Fraction</p>	<p><b>8 - Multiplying fractions by fractions</b></p> <p><i>We are learning to identify fractions of shapes.</i> (Introduction)</p> <p><i>We are learning to find fractions of fractions.</i></p> <p><i>We are learning how to multiply fractions.</i></p>	<p>48</p> <p>49</p> <p>50 to 51</p>
<p>Understand the meaning of the decimal fraction point and decimal place value to 1 d.p.</p>	<p><i>Teaching Addition and Subtraction and Place Value (Book 5 2007)</i></p> <p>Introducing Decimal Fraction Place Value</p> <p>The Decimal Fraction Point</p>	<p><b>9 - Decimal Fraction Place Value</b></p> <p><i>We are learning how tenths arise out of division.</i></p> <p><i>We are learning to use shorthand for tenths.</i></p>	<p>52 to 53 and 55</p> <p>54 to 55</p>
<p>Solve division problems that have fractional answers, e.g. <math>8 \div 3 = \frac{2}{3}</math> and connect division with the numerator and denominator of the answer e.g. <math>4 \div 5 = \frac{4}{5}</math>.</p>	<p><i>No specific Numeracy Book reference</i></p>	<p><b>10 - Dividing and fractions</b></p> <p><i>We are learning about division problems that have fractional answers.</i></p>	<p>56 to 57</p>

<p>Solve measurement problems with related fractions, by recognizing equivalent fractions, e.g. How many sixths are there in one and a half?  <math>(\frac{1}{12} \div \frac{1}{6} = \frac{2}{6} \div \frac{1}{6} = 9)</math></p>	<p><i>Teaching Number Sense and Algebraic Thinking (Book 8)</i>          Dividing Fractions</p> <p>Harder Dividing Fractions</p>	<p><b>11 - Dividing by fractions</b></p> <p><i>We are learning how to divide a fraction by a fraction.</i></p> <p><i>We are learning how to divide harder fractions.</i></p>	<p><b>58 to 60</b></p> <p><b>61 to 63</b></p>
<p>Convert fractions to decimals and vice versa.</p>	<p><i>Teaching Fractions, Decimals, and Percentages (Book 7)</i>          Deci-mats</p>	<p><b>12 - Writing decimals as fractions and vice versa</b></p> <p><i>We are learning to identify equivalent fractions and to name fractions as decimals.</i></p>	<p><b>64 to 67</b></p>
<p>Add and subtract decimals.</p>	<p><i>Teaching Addition, Subtraction and Place Value (Book 5 2007)</i>          Adding with Decimal Fractions</p> <p>Subtraction with Tenths</p> <p><i>Teaching Addition, Subtraction and Place Value (Book 5 2006)</i></p> <p>How Can Two Decimals So Ugly Make One So Beautiful?</p> <p>The Value of Place Value</p> <p>Subtracting Decimals and Getting the Point</p> <p><i>Teaching Fractions, Decimals, and Percentages (Book 7)</i>          Pipe Music with Decimals</p>	<p><b>13 - Adding and subtracting decimals with tenths</b></p> <p><i>We are learning to add with one decimal place fractions.</i></p> <p><i>We are learning to subtract with one decimal place fractions.</i></p> <p><b>14 - Adding decimals using place value</b></p> <p><i>We are learning to add decimals that add to a whole number.</i></p> <p><i>We are learning to add decimals using place value</i></p> <p><b>15- Subtracting decimals</b></p> <p><i>We are learning to subtract decimals with up to three decimal places.</i></p> <p><b>16 - Adding and subtracting decimals</b></p> <p><i>We are learning to add and subtract decimals using an efficient strategy.</i></p>	<p><b>68 to 69</b></p> <p><b>70 to 71</b></p> <p><b>72 to 73</b></p> <p><b>74 to 77</b></p> <p><b>78 to 81</b></p> <p><b>82 to 89</b></p>
<p>Multiply a whole number by a decimal fraction and divide by a whole number with tenths in the answer.</p>	<p><i>Teaching Addition, Subtraction and Place Value (Book 5 2007)</i>          Multiplication with Tenths</p> <p>Division with Tenths</p>	<p><b>17 - Multiplying and dividing decimals with tenths</b></p> <p><i>We are learning to multiply a whole number by a decimal fraction.</i></p> <p><i>We are learning to do simple division by a whole number with tenths in the answer.</i></p>	<p><b>90 to 93 and 95</b></p> <p><b>93 to 95</b></p>

Strategy	Numeracy Book reference	Unit in this book	Page
Understand place value of decimals when adding, subtracting, multiplying and dividing.	<i>Teaching Fractions, Decimals and Percentages (Book 7)</i> Candy Bars	<b>18 - Understanding decimals</b>  <i>We are learning about the place value of decimals when we add, subtract, multiply and divide.</i>	<b>96 to 99</b>
Show the order of decimals by developing a number line scale.	<i>Teaching Number Sense and Algebraic Thinking (Book 8)</i> Scales on Number Lines	<b>19 - Decimals on the number line and ordering decimals</b>  <i>We are learning how different scales are needed to show decimal numbers on number lines.</i>	<b>100 to 101</b>
	Confusing Fractions and Decimals	<i>We are demonstrating our number sense by showing the difference between decimal and fraction number lines.</i>	<b>102 to 103</b>
		<i>We are learning to order decimals using number lines.</i>	<b>104 to 105</b>
Round numbers and decimals.	<i>Teaching Number Sense and Algebraic Thinking (Book 8)</i> Whole Number Rounding	<b>20 - Rounding</b>  <i>We are learning to round numbers to the nearest 1, 10, 100 and 1000.</i>	<b>106 to 107 and 111</b>
	Rounding Decimals	<i>We are learning to round decimal numbers.</i>	<b>108 to 111</b>
Understand what happens when we multiply or divide by a number less than 1.	<i>Teaching Number Sense and Algebraic Thinking (Book 8)</i> When Big Gets Smaller	<b>21 - Multiplying and dividing by numbers less than 1</b>  <i>We are learning that multiplying by a number less than 1 makes the answer smaller.</i>	<b>112 to 114</b>
	When Small Gets Bigger	<i>We are learning that dividing by a number less than 1 makes the answer bigger.</i>	<b>115 to 117</b>
Use estimation to check answers to decimal multiplication and division problems.	<i>Teaching Number Sense and Algebraic Thinking (Book 8)</i> Estimation in Decimal Multiplication and Division Problems	<b>22 - Estimating with decimals</b>  <i>We are learning to use estimation to check the answers in decimal multiplication and division problems.</i>	<b>118 to 121</b>
Convert fractions to decimals and percentages and vice versa.	<i>Teaching Fractions, Decimals and Percentages (Book 7)</i> Deci-mats	<b>23 - Decimals, fractions and percentages</b>  <i>We are learning to write fractions and decimals as percentages and vice versa.</i>	<b>122 to 127</b>

<p>Estimate and find percentages of whole number amounts using benchmark percentages, e.g. 65% of \$80 as 50% is \$40, 10% is \$8, 5% is \$4, so \$40 + \$8 + \$4 = \$52.</p>	<p><i>Teaching Number Sense and Algebraic Thinking (Book 8)</i></p> <p>Estimating Percentages</p>	<p><b>24 - Finding percentages of quantities</b></p> <p><i>We are learning to calculate percentages of whole number amounts using benchmark percentages.</i></p> <p><i>We are using fractions equivalent to percentages to estimate percentages of given numbers.</i></p>	<p>128 to 129</p> <p>130 to 133</p>
<p>Solve simple rate problems using multiplication, e.g. picking 7 boxes of apples in <math>\frac{1}{2}</math> hour is equivalent to picking 21 boxes in <math>1\frac{1}{2}</math> hours.</p> <p>Find equivalent ratios using multiplication and division and express them as equivalent fractions e.g. 16 : 8 as 8 : 4 as 4 : 1 as 2 : 1 and <math>\frac{16}{24} = \frac{8}{12} = \frac{4}{6} = \frac{2}{3}</math>.</p>	<p><i>No specific Numeracy Book reference</i></p>	<p><b>25 - Introducing rates and ratio</b></p> <p><i>We are learning to solve simple rate problems using multiplication.</i></p> <p><i>We are learning to find equivalent ratios and write the equivalent fractions for these.</i></p>	<p>134 to 136</p> <p>137 to 141</p>
<p>Solve problems involving fractions, decimals, percentages and ratios using an efficient strategy.</p>	<p><i>No specific Numeracy Book reference</i></p>	<p><b>26 - Decimals, fractions and percentages smorgasbord</b></p> <p><i>We are learning to choose an efficient strategy to solve decimal, fraction and percentage problems.</i></p> <p><i>Note:</i> <i>This unit includes:</i> <i>Adding, subtracting, multiplying and dividing decimals</i> <i>Finding fractions and percentages of quantities</i> <i>Converting between fractions, decimals and percentages</i> <i>Equivalent fractions</i> <i>Ordering fractions and decimals</i> <i>Ratio</i></p>	<p>142 to 149</p>

## Algebraic Thinking

Strategy	Numeracy Book reference	Unit in this book	Page
Find relationships in repeating and sequential patterns and represent the relationships using additive and multiplicative rules, e.g In the sequence 3, 7, 11, 15,..., the tenth number is $10 \times 4 - 1 = 39$ .	<p><i>Teaching Number Through Measurement, Geometry, Algebra and Statistics (Book 9)</i> Sticky Moments</p> <p><i>Teaching Number Sense and Algebraic Thinking (Book 8)</i> Applying Remainders</p>	<p><b>27 - Patterns and rules</b></p> <p><i>We are learning to find the relationships in patterns and represent them as rules.</i></p> <p><i>We are learning to use remainders to solve patterning problems.</i></p>	<p><b>150 to 155 and 157 to 159</b></p> <p><b>156</b></p>
Find relationships and patterns in powers and square roots.	<p><i>Teaching Multiplication and Division (Book 6)</i> Powerful Numbers</p>	<p><b>28 - Powers and Patterns</b></p> <p><i>We are learning to solve multiplication problems with powers (exponents).</i></p>	<p><b>160 to 165</b></p>
Interpret and identify relationships in tables and graphs.	<i>No specific Numeracy book reference</i>	<p><b>29 - Tables and graphs</b></p> <p><i>We are learning to use tables and graphs to find relationships.</i></p>	<p><b>166 to 171</b></p>
Model situations with equations, expressions, and find the missing unknowns in the equations.	<i>No specific Numeracy book reference</i>	<p><b>30 - Expressions, formulae and equations</b></p> <p><i>We are learning to model situations with expressions.</i></p> <p><i>We are learning to model real-life situations with formulae and equations.</i></p> <p><i>We are learning to work out the rule for number patterns.</i></p>	<p><b>172 to 173</b></p> <p><b>174 to 175</b></p> <p><b>176 to 177</b></p>

# Number Knowledge

*Note: throughout this book, in the Number Knowledge box on the first page of each unit, references are made to the Number Knowledge that is in the Number Knowledge section of New Zealand Curriculum Mathematics Advanced Multiplicative Book 1 and Book 2. Only the Number Knowledge in Book 2 is given in this table. See the table on pages 14 to 16 of Book 1 for the Number Knowledge on Book 1.*

Being developed	Numeracy Book reference	Number Knowledge in this book	Page
Identifies decimals to three decimal places. (Number Identification)	<i>Teaching Number Knowledge (Book 4)</i> Number Fans Place Value Houses Number Hangman Reading Decimal Fractions More Reading Decimal Fractions Linking Money and Decimal Fractions Arrow Cards Number Line Flips Squeeze – Guess My Number	<b>Number knowledge unit A</b>  <i>Reading and writing decimals</i>	178
Recalls the number of tenths, hundredths and thousandths in numbers up to 3 decimal places. (Grouping / Place Value)	<i>Teaching Number Knowledge (Book 4)</i> Measurements and Zeros Tens in Hundreds and More	<b>Number knowledge unit B</b>  <i>Tenths, hundredths and thousandths</i>	179 to 180
Rounds whole numbers and decimals, with one to two places, to the nearest thousand, hundred, ten, whole number or tenth. (Grouping / Place Value)	<i>Teaching Number Knowledge (Book 4)</i> Swedish Rounding Sensible Rounding	<b>Number knowledge unit C</b>  <i>Rounding to decimal places</i>	181 to 182

Orders decimals to three places. (Number Sequence and Order)	<i>Teaching Number Knowledge (Book 4)</i> Number Fans Place Value Houses Reading Decimal Fractions More Reading Decimal Fractions Card Ordering Arrow Cards Rocket – Where will we find it Squeeze – Guess My Number Bead Strings Who Wins?	<b>Number knowledge unit D</b>  <i>Ordering decimals</i>	183
Says the forwards and backwards decimal word sequences by thousandths, hundredths, tenths, ones, tens, etc, starting at any whole number. (Number Sequence and Order)	<i>Teaching Number Knowledge (Book 4)</i> Number Fans Place Value Houses Number Hangman Skip counting on the Number Line Hundreds Boards and Thousand Book	<b>Number knowledge unit E</b>  <i>Skip counting in tenths, hundredths, and thousandths</i>	184 to 185
Recalls equivalent fractions for halves, thirds, quarters, fifths and tenths	<i>Teaching Number Knowledge (Book 4)</i> Super Liquorice Little Halves and Big Quarters Equivalent Fractions, Decimals and Percentages	<b>Number knowledge unit F</b>  <i>Equivalent fractions</i>	186
Orders fractions, including halves, thirds, quarters, fifths and tenths	<i>Teaching Number Knowledge (Book 4)</i> Creating Fractions More Geoboard Fractions Non Unit Fractions Packets of Lollies Reading Decimal Fractions Card Ordering Arrow Cards Rocket – Where will it Fit? Bead Strings Who Has More Cake?	<b>Number knowledge unit G</b>  <i>Ordering fractions</i>	187 to 188



<p>Finds a fraction of a whole number quantity.</p>	<p><i>Teaching Number Knowledge (Book 4)</i>          Number Fans          Packets of Lollies          Little Halves and Big Quarters</p>	<p><b>Number knowledge unit H</b>   <i>Finding what fraction of</i></p>	<p><b>189</b></p>
<p>Knows the fraction, decimal and percentage conversion for halves, thirds, quarters, fifths and tenths. e.g. <math>\frac{3}{4} = 0.75 = 75\%</math>.</p>	<p><i>Teaching Number Knowledge (Book 4)</i>          Bead Strings          Super Liquorice          Little Halves and Big Quarters          Equivalent Fractions, Decimals and Percentages          The Same but Different</p>	<p><b>Number knowledge unit I</b>   <i>Fractions, decimals and percentages</i></p>	<p><b>190 to 192</b></p>





**New Zealand Curriculum Mathematics**  
**Stage 7 Advanced Multiplicative Book 2**  
**Ratios and Proportions and Algebra**