Transition: Advanced Additive to Advanced Multiplicative Domain: Ratios and Proportions

Achievement Objectives	Number: Levels 4 and 5
	Level 4 Number strategies and knowledge AO2: Understand addition and subtraction of fractions, decimals, and integers. Number strategies and knowledge AO3: Find fractions, decimals, and percentages of amounts expressed as whole numbers, simple fractions, and decimals Number strategies and knowledge AO4 Apply simple linear proportions, including ordering fractions. Number strategies and knowledge AO5 Know the equivalent decimal and percentage forms for everyday fractions. Number strategies and knowledge AO6 Know the relative size and place value structure of positive and negative integers and decimals to three places. **Level 5** Number strategies and knowledge AO3: Understand operations on fractions, decimals, percentages, and integers.

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Find equivalent fractions by splitting, e.g. $\frac{3}{4} = \frac{15}{20}$, by splitting each quarter into fifths.	What would the part be called, if you cut…? One third into 4 pieces ($\frac{1}{4} \times \frac{1}{3} = \frac{1}{12}$) One fifth into 3 pieces One sixth into 2 pieces One half into 6 pieces $\frac{1}{4} = \frac{}{16}$, $\frac{1}{6} = \frac{}{36}$, $\frac{3}{4} = \frac{}{20}$, $\frac{3}{5} = \frac{9}{}$, $\frac{7}{8} = \frac{28}{}$, $\frac{9}{10} = \frac{}{1000}$,	***Teaching Fractions, Decimals and Percentages (Book 7)*** Introduction (35-37) ***Teaching Number Sense and Algebraic Thinking (Book 8)*** Equivalent Fractions (16) ***Figure It Out*** N3.1 Fun with Fractions (9) N3.1 More Fractions (10) N3.1 Racing to New Heights (14) N3.3 Fraction Frenzy (22) N3-4.1 A Watery Mission (3) N3-4.2 (11) Sandwich Survey NS&AT 3.1 Fraction Tagging (18) N7/8 L2 Boxed Biscuits (24) PR 3-4.1 Paper Partitions (6)	Order decimals to three places, for examples, 6.25 and 6.3	***Teaching Number Knowledge (Book 4)*** Number Fans (4) Place Value Houses (5) More Reading of Decimal Fractions (9) Who Wins? (21) ***Figure It Out*** N 3 Decimal Day (15) N 3.2 Jumping Along (20) N 7/8 L.2 Expanding With Decimals (17) N 7/8 4.3 Awesome Athletes (13) N 7/8 4.5 Give it a Heave! (3) N 7/8 4.5 Gentle Giants (18)

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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.	Which fraction is bigger and by how much? $\frac{3}{4}$ or $\frac{2}{3}$ ($\frac{1}{12}$), $\frac{4}{5}$ or $\frac{3}{4}$ ($\frac{1}{20}$), $\frac{5}{8}$ or $\frac{2}{3}$ ($\frac{1}{24}$), $\frac{5}{8}$ or $\frac{7}{12}$ ($\frac{1}{24}$), $\frac{3}{8}$ or $\frac{4}{10}$ ($\frac{1}{40}$), $\frac{5}{6}$ or $\frac{3}{4}$ ($\frac{1}{12}$), $\frac{17}{12}$ or $\frac{5}{4}$ ($\frac{1}{6}$), $\frac{7}{3}$ or $\frac{11}{5}$ ($\frac{2}{15}$).	***Teaching Number Sense and Algebraic Thinking (Book 8)*** Estimating with Fractions (15) Fractions (16) ***Figure It Out*** NS&AT 3-4.1 Close Ties (14)	Order fractions, including halves, quarters, thirds, fifths, and tenths	***Teaching Number Knowledge (Book 4)*** Creating Fractions (6) More Geoboard Fractions (7) Non-unit Fractions (7) Packets of Lollies (8) Reading Decimal Fractions (8) Card Ordering (12) Arrow Cards (13) Rocket - Where Will I Fit (15) Who Has More Cake? (18) Who Gets More? (20) Bead Strings (17) ***Figure It Out*** N 2-3 Circle Segment (17) N 2-3 Fabulous Folding (18) N 2-3 How Many? (20)
Find fractions of lengths, areas, volumes and other continuous quantities using reunitising, e.g. three quarters of one half is three eighths	$\frac{1}{2}$ of $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{8}$ $\frac{2}{3}$ of $\frac{1}{2} = \frac{2}{6} = \frac{1}{3}$ $\frac{3}{4}$ of $\frac{2}{3} = \frac{6}{12} = \frac{1}{2}$ $\frac{3}{4}$ of $\frac{3}{4} = \frac{9}{16}$ $\frac{4}{5}$ of $\frac{1}{3} = \frac{4}{15}$	***Figure It Out*** PR 3+ Puzzling Patterns (1) PR 3+ Shaping Up (2) PR 3+ What Do You See? (6) PR 3-4.1 Tri Fractions (4)	Record the results of mental calculations using equations and diagrams, for example, empty number line	

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Find fractions of whole number amounts using multiplication and division, e.g. $\frac{2}{3}$ of 36 = ☐ ($\frac{2}{3}$ × 36).	$\frac{3}{5}$ of 60 = ☐, $\frac{5}{8}$ of 64 = ☐, $\frac{5}{6}$ of 42 = ☐, $\frac{4}{7}$ of 56 = ☐ $\frac{3}{5}$ of ☐ = 27, $\frac{4}{9}$ of ☐ =16, $\frac{7}{10}$ of ☐ = 84, $\frac{}{8}$ of 72 = 27, $\frac{}{12}$ of 48 = 28	***Teaching Number Sense and Algebraic Thinking (Book 8)*** Whole Numbers Times Fractions (22) Fractions Times Whole Numbers (23) ***Figure It Out*** N3.2 Heading for Home (24) N3.3 Marble Marvels (21) N3-4.2 Funky Fractions (12) N3-4.2 Measuring Up (13) N3-4.3 Sporting Fractions (16) NS & AT 3.2 On Top of the World (22) NS7/8 4.2 Mystery Fractions (21) N7/8 L2 Placing Points (18) N7/8 4.3 Linking Lollies (1) N7/8 4.3 Football Fractions (4) PR 3+ Star Clusters (5) PR 3-4.1 Fraction Extraction (8)	Recall fraction ⇔ decimal ⇔ percentage conversions for halves, thirds, quarters, fifths, and tenths	***Teaching Number Knowledge (Book 4)*** Equivalent Fractions, Decimals and Percentages (21) Bead Strings (17) ***Figure It Out*** N3.1 (13) Friendly Fractions N 3-4 (11) A Long Look at Decimals N 3-4.2 (15) Fraction Distraction N 3-4.3 (24) Hidden Help BF 3-4 (21) Mystery Decimals BF 3-4 (24) Decimal Spotting N 7/8 L2 (9) Seeing Double N 7/8 L2 (20) Getting the Point
Multiply fractions by other fractions, e.g. $\frac{2}{3}$ x $\frac{3}{4}$ = $\frac{6}{12}$ = $\frac{1}{2}$	$\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$, $\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$, $\frac{3}{4} \times \frac{2}{5} = \frac{6}{20}$, $\frac{5}{8} \times \frac{1}{2} = \frac{5}{16}$, $\frac{2}{3} \times \frac{1}{5} = \frac{2}{15}$, $\frac{5}{6} \times \frac{2}{3} = \frac{10}{18} = \frac{5}{9}$,	***Teaching Number Sense and Algebraic Thinking (Book 8)*** A Fraction Times a Fraction (24) When Big Gets Smaller (24)		

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Rename improper fractions as mixed numbers using division, and position improper fractions on a number line.	$\frac{27}{4} = 6\frac{3}{4}$, $\frac{43}{5} = 8\frac{3}{5}$, $\frac{23}{3} = 7\frac{2}{3}$, $\frac{65}{9} = 7\frac{2}{9}$, $\frac{76}{8} = 9\frac{1}{2}$, $\frac{100}{3} = 33\frac{1}{3}$	***Teaching Number Sense and Algebraic Thinking (Book 8)*** Fractions Greater Than 1 (17) ***Figure It Out*** PR 3-4.1 Fraction Line-up (2)	Recall equivalent fractions for halves, thirds, quarters, fifths, and tenths with numbers to 100 and with 1 000	***Teaching Number Knowledge (Book 4)*** Super Liquorice (19) Little Halves and Big Quarters (19) Equivalent Fractions, Decimals and Percentages (21) The Same But Different (30) ***Figure It Out*** N 3.1 Fun With Fractions (9) N 3.1 More Fractions (10) N 3.1 To Market, To Market (11) N 3.3 Fraction Frenzy (22) N3-4.2 Sandwich Survey (11) N 7/8 L.1 Chocolate Chip Feast (22) N 7/8 L.2 Classy Courtyards (22) PR 3-4.2 The Equivalence Game (18)

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Solve division problems that have fraction answers, e.g. 8 ÷ 3 = $2\frac{2}{3}$, and connect division with the numerator and denominator of the answer, e.g. 4 ÷ 5 = $\frac{4}{5}$.	5 ÷ 4 = ☐, 8 ÷ 3 = ☐, 12 ÷ 5 = ☐, 5 ÷ 6 = ☐, 3 ÷ 7 = ☐, 13 ÷ 8 = ☐, 1 ÷ ☐ = $\frac{1}{7}$,7 ÷ ☐ = $2\frac{1}{3}$, 2 ÷ ☐ = $\frac{2}{5}$,17 ÷ ☐ = $1\frac{7}{10}$, ☐ ÷ 3 = $3\frac{1}{3}$,☐ ÷ 5 = $1\frac{4}{5}$, ☐ ÷ 6 = $1\frac{5}{6}$,☐ ÷ 9 = $4\frac{8}{9}$,	***Figure It Out*** N3.1 Friendly Fractions (13) N 7/8 4.5 Revisiting Remainders (1)	Round whole numbers and decimals with up to two places to the nearest whole number or tenth	***Teaching Number Knowledge (Book 4)*** Sensible Rounding (28) Swedish Rounding (28) ***Figure It Out*** N 3-4 .3 Paddle On (6) N 7/8 4.5 Body Mass (10)
Convert fractions to decimals, and percentages and vice versa.	3 ÷ 2 = $1\frac{1}{2}$ = 1.5 = 150% 5 ÷ 4 = $1\frac{1}{4}$ = 1.25 = 125% 3 ÷ 8 = $\frac{3}{8}$ = 0.375 = 37.5% 2 ÷ 3 = $\frac{2}{3}$ = $0.\dot{6}$ = $66.\dot{6}$ % $\frac{7}{5}$ = ☐, $\frac{5}{7}$ = ☐.	***Teaching Fractions, Decimals and Percentages (Book 7)*** Deci-mats (41-44) ***Figure It Out*** BF 3-4 Mystery Decimals (21) BF 3-4 Decimal Spotting (24) N 3-4.1 Waves Win (8) N 3-4.1 Bottle Up (10) N 3-4.1 A Long Look at Decimals (11) NS 7/8 4.2 Pizza Pieces (19) N 7/8 L2 Seeing Double (9) N 7/8 L2 Getting the Point (20) N 7/8 4.3 Conversion Cousins (2) PR 3+ Discount Deals (8)		

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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	10% of 48 so 30% of 48 50% of 64 so 25% of 64 10% of 28 so 5% of 28 50% of 56, 10% of 56 so 60% of 56 10% of 35, 5% of 35 so 15% of 35 50% of 140, 10% of 140, 5% of 140 so 65% of 140	***Teaching Fractions, Decimals and Percentages (Book 7)*** Hot Shots (47-49) ***Figure It Out*** NS & AT 3-4.1 Pondering Percentages (12) N3.2 Better Buy Bargains (18) N 3.3 Surf's Up (24) N 3-4.1 Hot Shots (12) N 3-4.2 Making Money (16) NS&AT 3-4.1 Pondering Percentages (12) NS 7/8.L1 Playzone Discount (16) NS 7/8 4.2 People Power (15) N 7/8 4.3 Involving Interest (6) N 7/8 4.3 New Car Capers (14) N 7/8 4.5 Bargain Bonanza (14) N 7/8 4.6 Spending on Sport (10) PR 3+ Getting Tough (14)
Add and subtract fractions with related denominators, e.g. $\frac{3}{4} + \frac{5}{12} = \frac{14}{12} = 1\frac{2}{12}$.	$\frac{3}{4} + \frac{3}{4} = \frac{6}{4} = 1\frac{1}{2}$ $\frac{2}{3} + \frac{4}{3} = \frac{6}{3} = 2$ $\frac{4}{5} - \frac{2}{5} = \frac{2}{5}$ $\frac{3}{4} + \frac{5}{8} = \frac{11}{8} = 1\frac{3}{8}$ $\frac{9}{10} - \frac{3}{5} = \frac{3}{10}$ $\frac{2}{3} + \frac{5}{6} = \frac{9}{6} = 1\frac{1}{2}$ $\frac{7}{8} - \frac{1}{2} = \frac{3}{8}$	***Teaching Fractions, Decimals and Percentages (Book 7)*** Comparing Apples with Apples (38) ***Teaching Number Sense and Algebraic Thinking (Book 8)*** Estimating with Fractions (15) ***Figure It Out*** N 3.3 Stacking Up (20) N 7/8 4.5 Egyptian Fractions (23) PR 3-4.1 Galloping Greyhounds (1)

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Add and subtract decimals.	1.2 + 3.8 = 4 0.75 + 1.25 = 2 5 – 2.25 = 2.75 0.5 + 1.25 = 1.75 2.5 – 1.75 = 0.75 0.375 + 1.625 = 2 3 – 0.001 = 2.999 2.673 + 1.327 = 4 5.2 – 1.68 = 3.52	***Teaching Fractions, Decimals and Percentages (Book 7)*** Pipe Music with Decimals (38-41) How Can Two Decimals so Ugly..? (45-46) ***Figure It Out*** N 3.2 Target Time (16) N 3.2 Dallying with Decimals (17) N 3-4.3 Riding the Waves (2) N 7/8 4.3 Going for Gold! (12) Pr 3+ Make 1.5 (18)
Solve measurement problems with related fractions, by recognising equivalent fractions, e.g. How many sixths are in one and one half? ($1\frac{1}{2} \div \frac{1}{6} = \frac{9}{6} \div \frac{1}{6} = 9$)	Wholes and parts: e.g. cakes and pieces, lolly snakes and pieces, etc. How many…? $\frac{1}{4}$'s in $\frac{3}{2}$ ($\frac{3}{2} \div \frac{1}{4} = \frac{6}{4} \div \frac{1}{4} = 6$) $\frac{1}{10}$'s in $\frac{4}{5}$ ($\frac{4}{5} \div \frac{1}{10} = \frac{8}{10} \div \frac{1}{10} = 8$) $\frac{1}{6}$'s in $\frac{5}{3}$ ($\frac{5}{3} \div \frac{1}{6} = \frac{10}{6} \div \frac{1}{6} = 10$) $\frac{3}{4}$'s in $4\frac{1}{2}$ ($\frac{9}{2} \div \frac{3}{4} = \frac{18}{4} \div \frac{3}{4} = 6$) $\frac{3}{8}$'s in $\frac{9}{4}$ ($\frac{9}{4} \div \frac{3}{8} = \frac{18}{8} \div \frac{3}{8} = 6$) $\frac{5}{12}$'s in $\frac{10}{3}$ ($\frac{10}{3} \div \frac{5}{12} = \frac{40}{12} \div \frac{5}{12} = 8$)	***Teaching Number sense and Algebraic Thinking (Book 8)*** Dividing Fractions (21)

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Show the order of decimal numbers by developing a number line scale	On a 0-5 scale show: 2.5, 1.25, 4.9, 3.75, 0.67 On a 0-2 scale show: 0.2, 1.8, 0.66, 1.95, 1.125	***Teaching Number sense and Algebraic Thinking (Book 8)*** Scales on Number Lines (19) Whole Number Rounding (19) Confusing Fractions and Decimals (20)
Solve simple rate problems using multiplication, e.g. Picking 7 boxes of apples in $\frac{1}{2}$ hour is equivalent to 21 boxes in $1\frac{1}{2}$ hours.	Washing cars: 4 in 1 hour = 32 in 8 hours 7 in 2 hours = 35 in 10 hours 3 in $\frac{1}{2}$ hour = 18 in 3 hours 9 in $1\frac{1}{2}$ hours = 36 in 4 hours 5 in $\frac{3}{4}$ hour = 40 in 6 hours	***Figure it Out*** N 3.3 Numbers on the Line (2) N 3-4.1 More Thinking (21) N 3-4.2 Paddling Down the Waikato (19) N 3-4.3 Challenge Time (4) N 3-4.3 Paddle On (6) N 3-4.3 Feel the Beat (11) NS 7/8.1 Grocery Grapplers (20) NS 7/8.1 Shopping Around (22) N 7/8 4.3 Kapa Haka Hāngi (17) PR 3+ Speed Read (10) PR 3+ Demolition Dollars (16) PR 3+ Painting by Numbers (17) PR 3+ Tiring Teamwork (21)
Find equivalent ratios using multiplication and division and express them as equivalent fractions, e.g. 16:8 as 8:4 as 4:2 as 2:1 and $\frac{16}{24} = \frac{8}{12} = \frac{4}{6} = \frac{2}{3}$	10:15 as 2:3 and $\frac{10}{25} = \frac{2}{5}$ 20:10 as 10:5 as 2:1 and $\frac{20}{30} = \frac{10}{15} = \frac{2}{3}$ 12:36 as 6:18 as 3:9 as 1:3 and $\frac{12}{48} = \frac{6}{18} = \frac{3}{9} = \frac{1}{4}$ 18:27 as 6:9 as 2:3 and $\frac{18}{45} = \frac{6}{15} = \frac{2}{5}$ 45:15 as 9:3 as 3:1 and $\frac{45}{60} = \frac{9}{12} = \frac{3}{4}$ 16:48 as 8:24 as 4:12 as 2:6 as 1:3 and $\frac{16}{64} = \frac{8}{32} = \frac{4}{16} = \frac{2}{8} = \frac{1}{4}$	***Teaching Fractions, Decimals and Percentages (Book 7)*** Mixing Colours (50-52) ***Figure it Out*** N 3-4.1 Stretch and Grow (4) N 3-4.1 Bean Brains (9) NS&AT 3.1 Run Like the Wind (12) NS&AT 3-4.2 Lunchtime Mardi Gras (18-20) NS 7/8 4.2 Balancing Act (22) N 7/8 4.5 Bargain Packs (15) N 7/8 4.6 Hypertufa Tiles (17) PR 3+ Chocolate Choices (4) PR 3+ Pop Star Pics (20) PR 3-4.1 Smart Sizes (21) PR 3-4.1 The Right Gear (20)