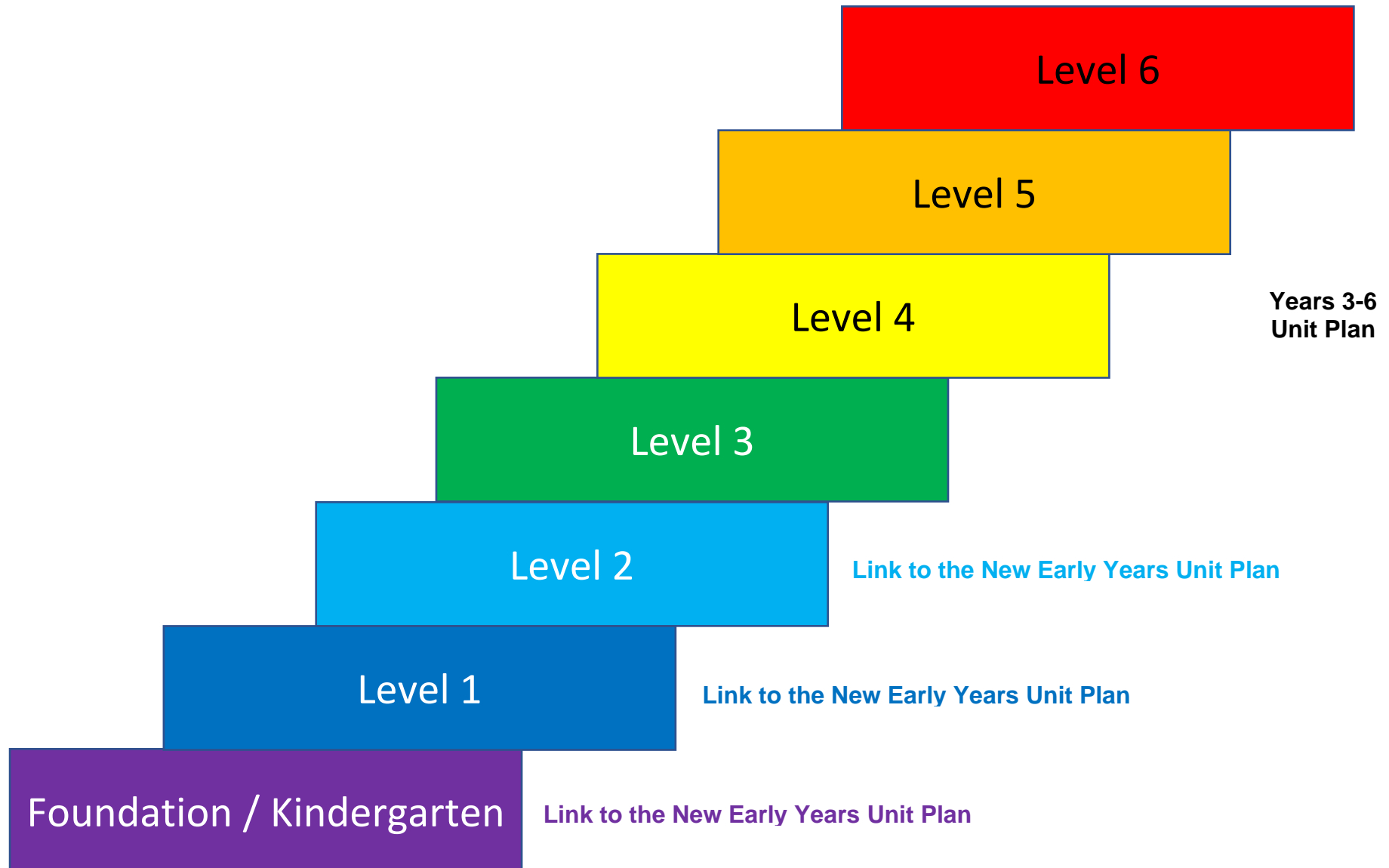


Colour coded by the rainbow



Critical Learning Goals **and Checkpoints**

Created and used by teams in Top Ten Maths schools to provide a strong sequence of big ideas for each year level, and to guide teachers as to the main priorities for their year level for number and algebra.

Where teams find a particular element of the curriculum progresses very fast for particular year levels (for example, year 3/4 students are expected to learn all the times tables during those two years), the content has been more realistically broken down and allocated to teams to make it more developmentally achievable. Likewise, some skills intentionally front-load content that can be achieved earlier, such as students learning the names of the tens by skip-counting by 10 up to 120 during the first year of school, even though the curriculum does not require this until year 1.

Skills and Strategies

Staircases

Mathematical development follows a sequential staircase of skills and strategies. This means that if one step in the staircase is missing, this will become a major obstacle for the student, unless that skill or strategy is addressed, before progressing to the more advanced content.

Consider the build to ten addition strategy as an example. To use this strategy, a student must be able to work out that $8 + 5$ can be solved by thinking $8 + 2$ (makes 10) + 3 more makes 13. This appears simple for adults who are fluent, but for students this requires the ability to partition 5 fluently into parts, then hold these parts while applying the 10 facts with fluency as well. It also relies partly on the counting on concept, in that students must start from the larger of the two addends (the 8, rather than the 5). In all, students need to have mastered three previous steps in the addition skills and strategies staircase to have any opportunity to master the build to ten strategy. Without ensuring students have already mastered all these previous steps first, a teacher could spend months trying to develop their students' understanding and fluency of the build to ten strategy, to no avail.

Critical Checkpoints for Place Value

The big goals, by the end of the unit, are that all students in this year level can:

<p>First Year of School</p>	<p>Count, make and read numbers up to 10 with 1-1 correspondence, says ordinal numbers up to 10</p>	<p>Subitise regular/dot dice formats up to 6 “I see 6!” or “I see 3, I see 3, I see 6!”</p>	<p>Correctly form all digits (0-9 starting from the top, without reversals) Compare and order single-digit numbers</p>	<p>Fluent with one more / less of any single-digit number</p>
<p>Level 1</p>	<p>Count to and back from 120 from any starting point learning the names of the tens first; bridging over 100 correctly, e.g. 99, 100, 101, 102 e.g. 90, 100, 110, 120</p>	<p>Subitise irregular / random formats seeing totals up to 10 using parts, even when arranged randomly, “I see 5, I see 3, I see 8!”</p>	<p>Make tens (2-digit) numbers using bundling materials and place value blocks. Record in place value form (34 as 3t 4 ones), standard (34) and worded forms (thirty-four). Rename (3t 4u, 2t 14u). Round to ten.</p>	<p>Work out one more and one less of a two-digit number</p>
<p>Level 2</p>	<p>Count to and back from 1000 from any starting point by ones, tens and hundreds</p>	<p>Say, record and order 3-digit numbers Place value form (452 = 4h 5t 2), standard (452) and worded forms (four hundred <u>and</u> fifty-two).</p>	<p>Make 3-digit numbers with place value blocks Round to nearest hundred/ten, place on number lines.</p>	<p>Work out ten more / less of 2- and 3-digit numbers Notice patterns (only tens change)</p>

<p style="text-align: center;">Level 3</p>	<p>Rename 3- and 4-digit numbers e.g. 340 as 34 tens, 340 ones, 2h + 14t e.g. 4530 as 45 hundreds and 3 tens, or 453 tens</p>	<p>Say, record and order 4-digit numbers, Place value form (1056 = 1uth 0h 5t 6u), standard and worded forms, focus on internal zeroes.</p>	<p>Make 4-digit numbers using place value blocks Round to nearest thousand/hundred/ten, place on number lines.</p>	<p>Work out 100 and 1000 more/less of any number up to 4-digits</p>										
<p style="text-align: center;">Level 4</p>	<p>Estimate large collections accurately (within 25% at least)</p>	<p>Say, record and order 5-digit numbers Place value form, standard form, worded form.</p>	<p>Flexibly work with 5-digit numbers placing on number lines, rounding to all places, renaming</p>	<p>Represent decimals as money (\$0.65), round to nearest whole (dollar)</p>										
<p style="text-align: center;">Level 5</p>	<p>Work out the factors and multiples of 2-digit numbers Connect factors to divisibility (if you divide 63 by 7, there will be no remainders, since 7 is a factor of 63)</p>	<p>Flexibly work with 6-digit numbers Round to all places; rename; place on number lines; flexible expanded form (168 350 + 150 000, partition 168 350 into 150 000 and 18 350, and double the 150 000 first)</p>	<p>Visualise decimals (square models, money, measurement) Compare and order numbers with up to 3 decimal places</p>	<p>Place unit fractions (1/6, 1/9) and decimals up to 3 places on number lines</p>										
<p style="text-align: center;">Level 6</p>	<p>Justify why a number is prime, composite, square or triangular Work with millions and beyond</p>	<p>Create and solve algebraic rules</p> <table border="1" data-bbox="958 1378 1326 1535"> <thead> <tr> <th>INPUT</th> <th>OUTPUT</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>13</td> </tr> <tr> <td>30</td> <td>88</td> </tr> <tr> <td>120</td> <td>358</td> </tr> <tr> <td colspan="2">Rule is $x \times 3 - 2$</td> </tr> </tbody> </table>	INPUT	OUTPUT	5	13	30	88	120	358	Rule is $x \times 3 - 2$		<p>Work with integers, particularly negative whole numbers</p>	<p>Place proper fractions (2/3, 5/9), decimals, integers on number lines</p>
INPUT	OUTPUT													
5	13													
30	88													
120	358													
Rule is $x \times 3 - 2$														

Place Value Staircase

Early Years



Place Value Staircase

Years 3-6

Level 6

Place fractions (non-unit, for example, $\frac{3}{5}$), decimals and integers on number lines

Work with integers (particularly negative whole numbers)

Justify prime, composite, square and triangular numbers

Work with millions numbers and beyond

Place unit fractions and decimals on number lines

Work out factors and multiples of numbers

Record, compare and order decimals up to 3 places

Level 5

Flexibly work with hundreds of thousands numbers, recording in all formats (place value form, words, digits), renaming and flexibly partitioning

Understand and record decimals as money and measurements (0.6 as \$0.60 and or 0.6m), round to nearest whole

Level 4

Rename and flexibly partition tens of thousands numbers

Round tens of thousands numbers to any place value

Say, record in all forms and order numbers 5-digit numbers

Estimate large collections with accuracy (within 25%)

Level 3

Work out 100 and 1000 more and less than any 2-, 3- and 4-digit number using an understanding of place value (which places change, and which stay the same)

Rename 3- and 4-digit numbers

Round numbers up to 10 000 to the nearest ten, hundred and thousand

Make 4-digit numbers using place value blocks, recording in digits, words and place value form

Years 3-6
Place Value

Critical Checkpoints for Addition

The big goals, by the end of the unit, are that all students in this year level can:

<p>First Year of School</p>	<p>Count all to solve an addition situation and retell it orally using the word ‘and’, e.g. “I have 3 jelly beans AND you have 4 jelly beans. We have 7 jelly beans altogether!”</p>	<p>Fluently partition numbers up to 6 (can name all the combinations/ways to make 3, 4, 5 and 6 without materials, e.g. 3 and 3 makes 6, 4 and 2 makes 6, 5 and 1 makes 6)</p>	<p>Fluent with one more than any single-digit number e.g. $7 + 1$, immediately thinks 7 and 1 more is 8 (without materials), later 2 more</p>
<p>Level 1</p>	<p>Draw or write an addition (and) story to match an equation e.g. the student is given $3 + 4$, they draw, write or retell orally: “I have 3 red M&Ms and 4 blue M&Ms, I have 7 altogether!”</p>	<p>Fluently recall the 10 facts and partition all numbers up to 10 (knows all the ways to make 7, 8, 9 and 10)</p>	<p>Count on from the larger number by using turnarounds (commutativity) for single-digit additions e.g. $2 + 5$, start at 5 and counts 2 more mentally</p>
<p>Level 2</p>	<p>Fluently recall the doubles facts up to $10 + 10$ ($2+2, 3+3, 4+4, 5+5, 6+6, 7+7, 8+8, 9+9, 10+10$)</p>	<p>Use near doubles and explain how they did it (6 and 7, I thought 7 and $7 - 1$ OR 6 and $6 + 1$ more)</p>	<p>Build to 10 and explains how (e.g. 7 and 5, I did $7 + 3 + 2$; or, alternatively, I thought $6 + 6$ by moving 1 from the 7 to the 5)</p>
<p>Add ten to any 2-digit and 3-digit number Notices the pattern that only the tens change, ones stay the same</p>			

<p>Level 3</p>	<p>Add 5 or more numbers using the best strategies for that equation (10s facts, doubles, near doubles, building to 10)</p>	<p>Use jump and split strategies <u>on paper</u> to solve 2- and 3-digit problems Open number lines for jump, estimates by rounding first (nearest 10/100)</p>	<p>Use place value to partition numbers to make additions easier e.g. $500 + 670 = 5h + 5h + 170 = 1170$ Extends number facts: $2 + 3 = 5$, so $2h + 3h = 5h$</p>
<p>Level 4</p>	<p>Use single-digit strategies (near doubles and building to ten) for larger place values e.g. $670 + 780$, thinks $6 + 7 = 13$ (near doubles), $6h + 7h = 13h$, $70 + 80 = \text{double } 7t + 1t = 15t$, so 1450</p>	<p>Use the jump and split strategies <u>mentally</u> to solve 2- and 3-digit addition problems</p>	<p>Use the vertical algorithm for additions of up to 4-digits (only when jump and split strategies are not more efficient)</p>
<p>Level 5</p>	<p>Use the compensation strategy for larger place values e.g. $670 + 780$ is the same as $7h$ (pretend the 670 is 700) + $8h$ (pretend 780 is 800) – 50 (what you added to both), so $15h - 50 = 1450$</p>	<p>Make reasonable estimates using rounding before calculating ($279 + 823 \approx 3h + 8h = 11h$ so expecting answer to be roughly 1100)</p>	<p>Use the vertical algorithm for additions of any size (only when jump, split and compensation are not more efficient)</p>
<p>Level 6</p>	<p>Choose the best strategy to solve complex worded problems involving addition (jump strategy, split strategy, vertical algorithm; excluding irrelevant information)</p>		<p>Use all addition strategies to add decimals Estimate first by rounding to the nearest whole</p>

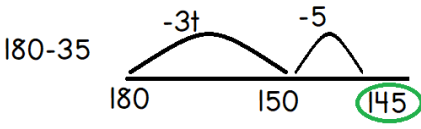
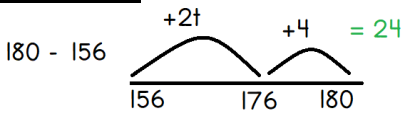
Addition Skills and Strategies Staircase



Critical Checkpoints for Subtraction

The big goals, by the end of the unit, are that all students in this year level can:

<p>First Year of School</p>	<p>Model a subtraction with materials and retell it orally using ‘take away’ (e.g. “I had 3 jellybeans, but my brother took one away. 2 were left!”)</p>	<p>Use fingers and drawings to solve subtraction problems</p>	<p>Solve one less than any single-digit number e.g. $7 - 1$, immediately thinks 1 less than 7 is 6 and can solve without materials</p>
<p>Level 1</p>	<p>Fluently recall the backwards 10 facts ($10 - 3 = 7$, because I know $7 + 3 = 10$)</p> <p>Solve a simple worded subtraction problem</p>	<p>Count back to solve subtractions from up to 20</p>	<p>Count on to solve the difference between numbers to 10 (e.g. $9 - 7$, “8 9, it’s 2”)</p>
<p>Level 2</p>	<p>Use backwards doubles and explain how (e.g. $14 - 7$, I thought $7 + 7 = 14$, so $14 - 7 = 7$)</p> <p>Create a simple worded subtraction problem</p>	<p>Counts and jumps back to solve 2-digit subtractions, including jumping back by tens, e.g. $80 - 17$, start with $80 - 10$ to get to 70, then $70 - 7 = 63$</p>	<p>Can count on to solve the difference between numbers up to 20 (e.g. $20 - 17$, the difference is 3)</p>

<p>Level 3</p>	<p>Apply fact families to use addition facts (e.g. $28 - 22$, I know $22 + 6$ is 28, so it is 6; <u>instead of counting or jump back by 22 from 28</u>)</p>	<p>Use ‘jump back’ on paper</p>  <p>180-35</p> <p>180 150 145</p> <p>-30 -5</p>	<p>Use ‘jump the difference’ on paper</p>  <p>180 - 156</p> <p>156 176 180</p> <p>+20 +4 = 24</p>
<p>Level 4</p>	<p>Use the compensation strategy e.g. $405 - 98 = 405 - 100 + 2$</p> <p>Calculate change to the nearest five cents by counting on or using the vertical algorithm</p>	<p>Use ‘jump back’ strategy <u>mentally</u> for 2- and 3-digit subtractions e.g. $657 - 63$, start at 657, jump back 57 to get to 600, jump back another 6 (to take away the full 63), the answer is 594</p>	<p>Use the vertical algorithm, including renaming up to 5 digits</p>
<p>Level 5</p>	<p>Use the ‘get to 9’ strategy to solve subtractions with internal zeroes e.g. $8003 - 6578$ Instead of renaming, change the 8003 to 7999 by taking away 4, also take 4 away from 6578 so the difference is still the same: $= 7999 - 6574$ Then solve in the algorithm (without needing to rename at all)</p>	<p>Use ‘jump the difference’ strategy <u>mentally</u> for 2- and 3-digit subtractions e.g. $657 - 582$, start at 582 + 18 to get to 600, then add 57 to reach 657, the difference was $57 + 18$, so 75</p>	<p>Use the vertical algorithm for subtractions of any size</p>
<p>Level 6</p>	<p>Chooses the best strategies to solve complex worded subtraction problems (jump back strategy, jump the difference strategy, vertical algorithm, get to 9 strategy)</p>		<p>Use the vertical algorithm to subtract decimals</p>

Subtraction Skills and Strategies Staircase



Critical Checkpoints for Multiplication

The big goals, by the end of the unit, are that all students in this year level can:

First Year of School	Say whether groups are equal (fair) or unequal (unfair)	Create equal groups using objects, naming the number that is common to each	Skip-count by 10 from zero up to 120 <small>(learn the names of the tens)</small>
Level 1	Name how many groups there are and the same number that is in each group	Use skip-counting as a strategy to solve small totals, recording using repeated addition number sentences	Skip-count by 5 and 2 from zero
Level 2	Create arrays and solve these by skip-counting <small>(by 10, 2, 5, 3 and 4); use arrays to model turnarounds ($3 \times 2 = 2 \times 3$)</small>	Fluently know the 2 (doubling) multiplication strategy <small>knows the multiples and factors, can write fact families for the 2 times tables</small>	Skip-count by 10, 5, 2 and 3 from any starting point
Level 3	Partition arrays to develop multiplicative strategies <small>(3×6 as double 6 and 6 more, 2×18 as double 18, 4×6 as double double 6)</small>	Fluently use the 10 (think tens), 5 (x10 and half it) and 3 (double + one group) strategies, <small>knows multiples and factors, can write fact families for these times tables</small>	Skip-count by 7s, 8s and 9s from zero <small>(for 9s, think 10 more 1 back; for 8s, think 10 more 2 back; for 7s 10 more 3 back)</small>

Level 3	Write and solve 'groups of' problems given a set equation (e.g. create a real-life problem about 10×3 , swap with a partner and solve)		
	Multiply 1-digit by a tens number using place value or the factorise strategy (e.g. 3×20 as 3×2 tens = 6 tens OR as $3 \times 2 \times 10 = 6 \times 10 = 60$)		
Level 4	Fluently use the 4s multiplication strategy (double double) e.g. 4×7 , see 4x think double double the other number, $d7 = 14$, $dd = 28$	Fluently use the 8s multiplication strategy (double double double)	Factorise as a multiplication strategy (e.g. $18 \times 5 = 9 \times 2 \times 5 = 9 \times 10 = 90$)
	Multiply 2-digit numbers by partitioning tens and ones mentally (e.g. 4×23 , think 4×2 tens and $4 \times 3 = 80 + 12 = 92$)	Multiply 2-digit numbers by applying the multiplication strategies e.g. 4×23 think double double	Use the area model for 1- by 2-digits
Level 5	Apply times tables and factorising strategies to 2- by 2-digit problems e.g. $12 \times 25 = 3 \times 4 \times 25 = 3 \times 100 = 300$ OR $10 \times 25 + 2 \times 25$	Fluently use the 9s multiplication strategy ($\times 10$ – one group) Fluently use the 6s multiplication strategy (double 3s, or use turnarounds)	Skip-count by any single-digit interval from any number

<p>Level 5</p>	<p>Estimate answers to multiplications using rounding and place value patterns (e.g. 17×52, round to 20×50 $2 \times 5 = 10$, $2 \times 50 = 100$ So: $20 \times 50 = 1000$) $E \approx 1000$</p>	<p>Uses the area model to multiply 1-digit by 4-digits, and 2-digits by 2-digits</p>	<p>Use the lattice strategy <u>or</u> vertical algorithm to solve 2-digits by 3-digits</p>
<p>Level 6</p>	<p>Fluently know the 7 (use commutativity) multiplication facts (7x3, think 3x7, solve using 3s strategy instead)</p>	<p>Use their <u>preferred strategy</u> (lattice, area, vertical algorithm) to multiply 2-digit by 4-digit numbers</p>	<p>Multiply decimals by whole numbers</p>
	<p>Chooses the best strategies to solve complex worded problems involving multiplication</p>	<p>Apply the order of operations (BODMAS)</p>	<p>Skip-count by decimals and fractions with the same denominator</p>

Multiplication Skills and Strategies Staircase



Multiplication Skills and Strategies Staircase

Level 6

Skip-count by decimals and fractions

Apply the order of operations (BODMAS)

Use their preferred strategy for 2- by 4-digits and decimals, solve complex worded problems

Fluently use all x strategies (including 7xs facts)

Use the lattice strategy or vertical algorithm for up to 2- by 3-digit problems

Use the area model for 1- by 4-digit and 2-digit by 2-digit problems

Level 5

Use multiplication strategies and factorising strategies for 2- by 2-digit problems

Estimate answers by rounding

Skip-count by any single-digit number from any non-zero starting point

Fluently use the 6s multiplication strategy (double the 3s, or turnaround known facts)

Fluently use the 9s multiplication strategy (x10 – one group)

Use the area model for 1-digit by 2-digits

Level 4

Multiply by partitioning (breaking up) tens and ones mentally

Factorise as a multiplication strategy (18 x 5 as $9 \times 2 \times 5 = 9 \times 10 = 90$)

Multiply by applying the times tables strategies to larger numbers

Fluently use the 8s multiplication strategy (double double double)

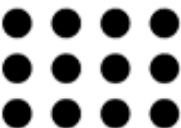
Fluently use the 4s multiplication strategy (double double)

Years 3-6
Multiplication

Critical Checkpoints for Division

The big goals, by the end of the unit, are that all students in this year level can:

First Year of School	Share objects equally between 2 people		Skip-count backwards by 10 from 120
Level 1	Share objects into equal groups and describe remainders e.g. “13 shared between 5 gives 2 to each with 3 remainders”	Skip-count backwards by 5 and 2 from 120	Write the number sentence for shared between situations with materials showing e.g. $12 \div 3 = 4$
Level 2	Share objects using arrays (arranged into equal numbers of rows and columns)	Fluently divide by 2 using backwards doubles / halving, fact family for 2 times tables Use skip-counting as a strategy to solve divisions by 5 and 10	Write division number sentences that include remainders e.g. $20 \div 7 = 2 \text{ r } 6$
Level 3	Create and solve both partitive and quotitive problems (e.g. Partition: 8 balloons, 4 people, how many did each person get? Quotition: 8 balloons, each person got 2, how many people?)	Fluently divide by 10, 5 and 3 fact families (uses reverse multiplication; for 5s, divides by 10 then doubles it), explain divisibility by these patterns	Make the connection between divisibility by 2 and odd/even numbers

<p>Level 3</p>	<p>Using an array, record the full multiplication and division fact family</p>  <p>3 rows of 4 is 12 $3 \times 4 = 12$ 4 columns of 3 is 12 $4 \times 3 = 12$ 12 shared into 3 rows is 4 $12 \div 3 = 4$ 12 shared into 4 columns is 3 $12 \div 4 = 3$</p>		
<p>Level 4</p>	<p>Use fact families to solve and justify answers to divisions (48 \div 8 = 6 because 6 \times 8 = 48)</p>	<p>Fluently use the 4 and 8 multiplication strategies to divide by halving (to divide by 4, half and half again, by 8 half half half)</p> <p>Explains divisibility by these patterns</p>	<p>Use multiplication to solve divisions involving remainders e.g. 27 \div 6, if 4 \times 6 = 24 and 5 \times 6 = 30, it is 4 r 3, because 4 \times 6 + 3 = 27</p> <p>e.g. 17 \div 4 = 4 r 1 because 4 \times 4 + 1 = 17</p>
<p>Estimate 3- and 4-digit divisions using rounding and place value e.g. 540 \div 8, well 8 \times 6t = 48t or 480, 8 \times 7t = 56t or 560, so closer to 70 than 60</p>			
<p>Level 5</p>	<p>Fluently divide by 6 (half, then divide by 3) and 9 (divide by 10 and round answer <u>up</u> to the next whole number; or just use the fact family)</p>	<p>Use mental strategies to divide 3-digits, including the multiply to divide strategy or partitioning into place values strategy: 253 \div 6, solve by: 6 \times <u>40</u> = 240, 6 \times <u>2</u> = 12, so 42 r 1 = 42 $\frac{1}{6}$ OR 240 \div 6 = 40 13 \div 6 = 2 r 1, so 42 $\frac{1}{6}$</p>	<p>Divide 3-digit numbers by 1-digit on paper using place values and the short/long division algorithm e.g. 3248 \div 4, partition it: 3200 \div 4 = 800 40 \div 4 = 10 8 \div 4 = 2, so it is 812</p>

Level 5	Use different notations to represent division $25 \div 4, 4 \overline{)25}, \frac{25}{4}$		
	Record remainders as fractions and decimals where appropriate for the context of the problem $25 \div 4 = 6\frac{1}{4}$ or 6.25		
Level 6	Fluently divide by 7 (can now use all fact families to divide mentally)	Divide 4-digit numbers by 1-digit using the short or long division algorithm (students can choose their preferred method)	Use the multiply to divide strategy for 3-digit divisions by a 2-digit number on paper e.g. to solve $564 \div 18$: $18 \times 10 = 180$ $18 \times 20 = 360$ $18 \times 30 = 540$ So, it will be 30 groups of 18 + 1 more group of 18 ($540 + 18 = 558$) with 6 remainders, so 31 r 6
	Chooses the best strategies to solve complex worded problems involving division (reverse multiplications, estimating, multiply to divide strategy, partitioning place values strategy, short or long division algorithm)		
	Divide decimals by 1-digit divisors e.g. $3.75 \div 3$		

Division Skills and Strategies Staircase


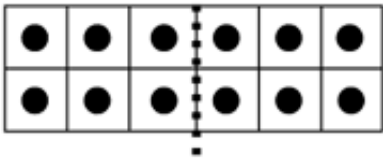
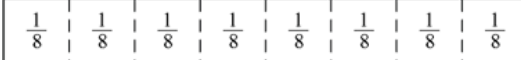


Division Skills and Strategies Staircase



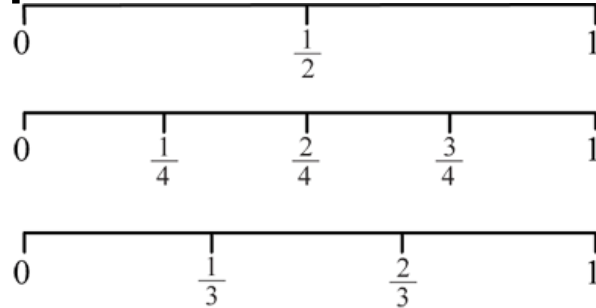
Critical Checkpoints for Fractions and Decimals

The big goals, by the end of the unit, are that all students in this year level can:

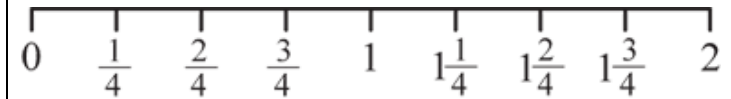
First Year of school	Use 'out of' language e.g. 2 out of 3 of the students at the front are girls		
	Know their ordinal numbers to at least 10		
Level 1	Describe two equal parts of a whole as two halves explains when something is not half and why	Use fraction notation for halves, understanding this as 1 <u>out of</u> 2 parts 	Solve half of collections 
Level 2	Identify and make quarters and eighths of shapes (including rectangles <u>and</u> circles) Strategy: Cut in half, then half (for quarters), then half again (for eighths) Use fraction notation for quarters and eighths 	Solve quarters and eighths of collections Strategy: Split the whole collection in half, then half (for quarters), then half again (for eighths)	Compare halves, quarters and eighths, e.g. $\frac{1}{8}$ is less than $\frac{1}{4}$ because it is 1 <u>out of</u> 8 parts, instead of 1 <u>out of</u> 4 e.g. $\frac{1}{2}$ is more than $\frac{1}{4}$ because it is 1 out of 2 parts, rather than 1 out of 4 parts
Level 3	Identify and make thirds and fifths (as well as halves, quarters and eighths) with any numerator e.g. creates $\frac{2}{3}$ or $\frac{3}{5}$ of a shape	Recognise equivalence to one whole , e.g. 5 out of 5 parts makes one whole, rename $\frac{2}{2}$ $\frac{3}{3}$ $\frac{4}{4}$ $\frac{5}{5}$ $\frac{8}{8}$ as 1	Count by halves, thirds and quarters

Level 3

Place halves, thirds and quarters on number lines



Place mixed numerals that include halves, thirds and quarters on number lines:

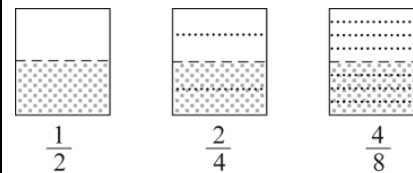


Level 4 Fractions

Identify and make fractions with denominators of 2, 4, 8; 3 and 6; 5, 10 and 100 (underlined are the new content introduced)

Identify equivalent fractions with related denominators

(halves with quarters and eighths; thirds with sixths; fifths with tenths)



Connect fractions to tenths and hundredths

Understand that $\frac{1}{10}$ is the same as 0.1 because both show 1 out of 10 parts (1 out of 10 parts of \$1)

$\frac{1}{100}$ is the same as 0.01 because both show 1 out of 100 parts (1 out of 100 parts of \$1)

Level 4 Decimals

Represent decimals as money

Understanding the wholes as dollars and parts as cents, separated by the decimal point.

Show money in decimal and fraction notation, e.g. \$5.35 as 5 whole dollars and 35 out of 100 cents:

$5 \frac{35}{100}$ or 5 wholes, 3 ten cents (tenths) and 5

single cents (hundredths): $5 + \frac{3}{10} + \frac{5}{100}$

Represent decimals as measurements

Understanding wholes as metres and parts as centimetres, separated by the decimal point

e.g. 123cm = 1.23m

e.g. 140cm = 1.40m = 1.4m (zeroes at the end do not change the value)

Level 5

Compare unit fractions (numerators of 1) **with denominators of 5, 6, 8, 10 and 12** (as well as 2, 3, 4), **places all on a number line** (with a numerator of 1)

Convert between improper and mixed fractions

$$\frac{7}{3} \begin{array}{|c|c|c|} \hline \text{shaded} & \text{shaded} & \text{partly shaded} \\ \hline \end{array} 2\frac{1}{3}$$

Compare, order and place decimals of up to 3 places on number lines from 0 to 1

Add and subtract fractions (including worded problems) with the same denominator, including where the result is an improper fraction or mixed numeral

$$\frac{4}{5} + \frac{3}{5} = \frac{7}{5} = 1\frac{2}{5}$$

Add mixed numerals with the same denominator

$$2\frac{1}{5} + 1\frac{2}{5} = 3\frac{3}{5}$$

Level 6 Fractions

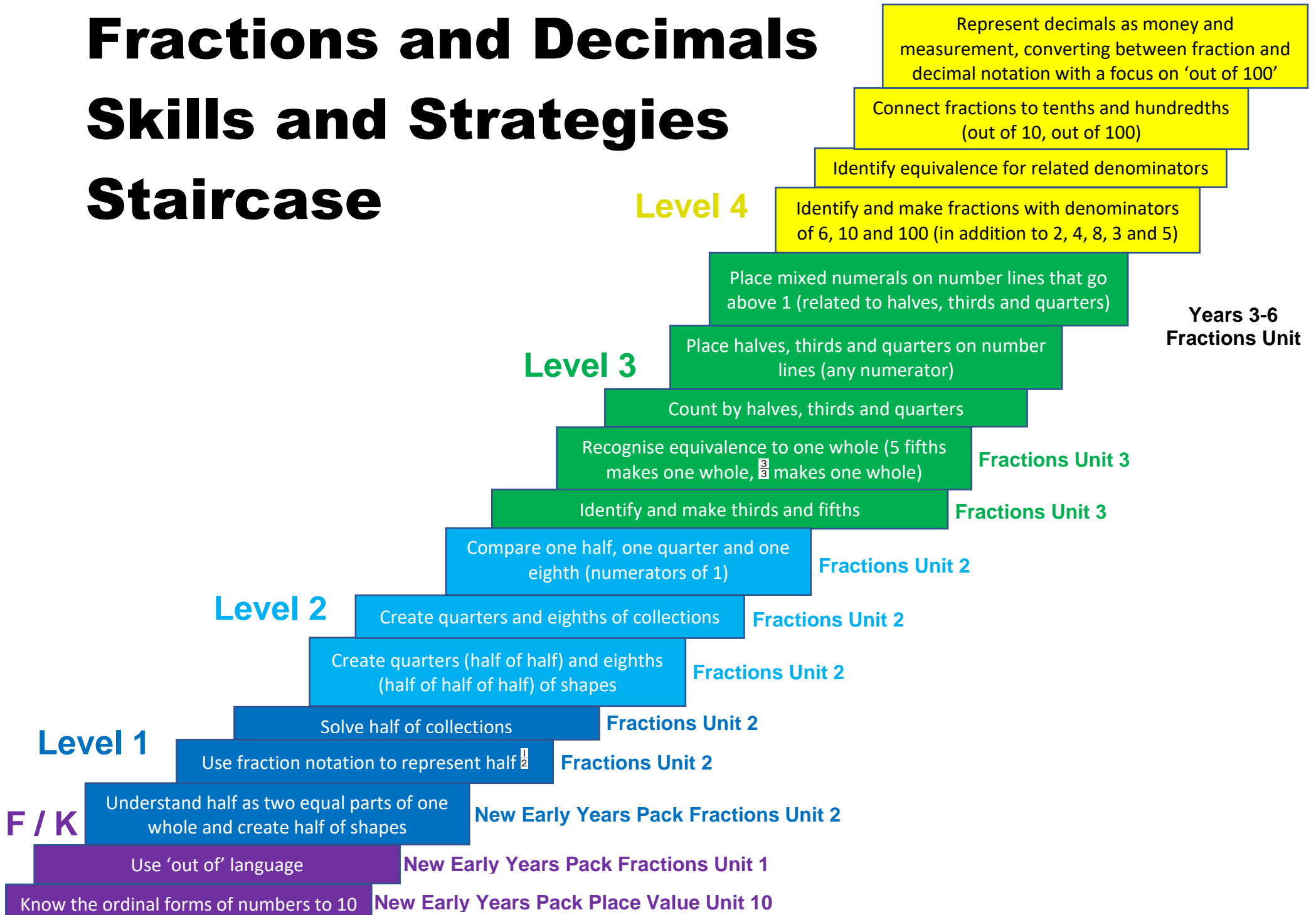
Compare and order fractions (any numerator) **with related denominators** (for denominators of 2-6, 8, 10, 12 and 100)

Add and subtract fractions with related denominators (e.g. 3, 6, 12; 2, 4, 8; 5, 10, 100)

Find equivalence and simplify fractions by multiplying or dividing the numerator and denominator by the same number

<p>Level 6 Converting between fractions, decimals and percentages</p> <p>Level 6 Operating with decimals (also mentioned in previous units)</p>	<p>Solve a fraction and percentage (10%, 25%, 50%) of a collection, connecting this to division</p> <p>e.g. to work out $\frac{3}{8}$ of 40, divide 40 by 8 (half half half) = 5, then multiply by 3 (3 x 5 = 15)</p> <p>e.g. to work out 25%, think half of half</p>		<p>Convert between fractions, decimals and percentages</p> <p>'25% means 25 out of 100 or $\frac{1}{4}$ or 0.25'</p> <p>75%, 0.75, $\frac{3}{4}$</p> <p>$1.37 = 137\% = \frac{137}{100} = 1\frac{37}{100}$</p>	
	<p>Add or subtract decimals to 3 places, first estimating the answer by rounding to the nearest whole number</p>	<p>Multiply decimals by whole numbers</p>	<p>Divide decimals by 1-digit whole numbers</p>	

Fractions and Decimals Skills and Strategies Staircase



Fractions and Decimals Skills and Strategies Staircase



Critical Checkpoints for Patterns and Algebra

Note: Many of these checkpoints overlap with Multiplication.

The big goals, by the end of the unit, are that all students in this year level can:

First Year of School	Sort objects in different ways and describe the categories they used to classify each collection	Continue and create AB (red, blue, red blue) and similar patterns with objects (shapes, counters), sounds (claps), actions (stomps)	
	Understand that a pattern must repeat		
	Skip-count by 10 from zero		
Level 1	Continue and create ABC, ABB, ABBC patterns or similar with objects, sounds and actions	Solve patterns counting by ones up to and back from 120	Skip-count by 5 up to 120 and backwards
	Skip-count by 2 up to 120 and backwards	Continue, create and describe the rules for patterns that increase or decrease by 10, 5 or 2	
Level 2	Solve a missing number in the middle of a pattern and explain how they did it, e.g. 3, 7, 11, __, 19, 23, 27	Solve missing parts in addition and subtraction problems $5 + \square = 13$ $15 - \square = 9$	Skip-count by 10, 5, 2 and 3 from any 2-digit number

<p>Level 3</p>	<p>Continue, create and describe the rules for patterns that increase or decrease by 3, 4, 6, 7, 8 and 9</p>		<p>Identify the pattern for odd/even, identify whether a number of any size is odd or even</p>
<p>Level 4</p>	<p>Solve missing parts in 2-digit addition and subtraction problems $\square + 55 = 83$, $\square - 15 = 19$</p>	<p>Solve $8 + \square = 6 + 7$ missing parts involving two operations in the number sentence</p>	<p>Continue, create and describe patterns that use multiplication, e.g. determine the next term in the pattern 4, 8, 16, 32, 64, ...</p>
	<p>Find missing numbers in multiplication and division number sentences $28 = \square \times 7$, $40 \div \square = 5$</p>	<p>Write multiplication and division number sentences to represent worded problems e.g. 'I buy six pens and the total cost is \$24. What is the cost of each pen?' can be represented as $6 \times \square = 24$ or $24 \div 6 = \square$</p>	
<p>Level 5</p>	<p>Use the inverse operation to solve number sentences for division of larger numbers (multiply to divide strategy) for 1-digit divisors $125 \div 5 = \square$ becomes $\square \times 5 = 125$</p>	<p>Solve missing parts involving two operations, one of which includes multiplication or division $5 \times \square = 4 \times 10$, $5 \times \square = 30 - 10$</p>	<p>Write number sentences to match and solve worded problems e.g. "I am thinking of a number that when I double it and add 5 it is 13. What is the number?"</p>

Level 6

Continue, create and describe patterns involving fractions and decimals

e.g. $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, ... or 1.25, 2.5, 5, ...

Use a table of values for geometric and number patterns to record and solve values of a large position number in the pattern

e.g. how many matches will you need to make 100 squares?

\square , $\square\square$, $\square\square\square$, $\square\square\square\square$, ... \rightarrow

number of squares	1	2	3	4	...	100
number of matches	4	8	12	16	...	

The pattern is multiplying by 4, so you will need 400 matches to make 100 squares

Recognise that if you carry out two inverse operations, the effect is nil (multiply and then divide by 3; add 3 and later subtract 3)

Plot points on the Cartesian Plane in all 4 quadrants