**Transition: Advanced Multiplicative to Advanced Proportional Domain: Multiplication and Division**

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| **Achievement Objectives** | **Number: Levels Four and Five** |
| **Level Four**  Number strategies and Knowledge A01:  Use a range of multiplicative strategies when operating on whole numbers.  **Level Five**  Number strategies and Knowledge A02:  Use prime numbers, common factors and multiples, and powers [including square roots].  Number strategies and Knowledge A06:  Know and apply standard form, significant figures, rounding, and decimal place value. |

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| **Strategies being developed** | **Problem progression** | **References** | **Knowledge being developed** | **Resources** |
| Use exponents to solve multiplication problems, including those with areas and volumes | 8 × 16 = 🞏 from 23 × 24 = 27  27 × 243 = 🞏 from 33 × 35 = 38  642 = 🞏 from 43 × 43 = 46  = 🞏 from 82 = 64  = 🞏 from 302 = 900  = 🞏 from 53 = 125 | ***Teaching Multiplication and Division (Book 6)***  [Powerful Numbers](https://nzmaths.co.nz/node/1027) (73-75)  ***Teaching Number Sense and Algebraic Thinking***  [Squaring](https://nzmaths.co.nz/node/995) (28)  [Square Roots](https://nzmaths.co.nz/node/994) (29)  [Cubes and Cube Roots](https://nzmaths.co.nz/node/998) (30)  ***Figure It Out***  N3-4.1 [Using Exponents](https://nzmaths.co.nz/node/3269) (22)  N7/8 4.4 [Family Trees](https://nzmaths.co.nz/node/3478) (13)  N7/8 4.4 [Building Squares](https://nzmaths.co.nz/node/3479) (14)  N7/8 4.6 [Powerful Thought](https://nzmaths.co.nz/node/3556) (4)  N7/8 4.6 [Factor Towers](https://nzmaths.co.nz/node/3560) (7)  N7/8 4.6 [Tiling Teasers](https://nzmaths.co.nz/node/3561) (8)  N7/8 4.6 [Alien Counting](https://nzmaths.co.nz/node/3568) (12)  N7/8 4.6 [Alien Bacteria](https://nzmaths.co.nz/node/3580) (20) | Know simple powers of numbers to 10,  e.g. 24 = 16, 53 = 125 | ***Figure It Out***  N7/8 4.4 [Calculator Power](https://nzmaths.co.nz/node/3482) (16)  N7/8 4.4 [Cubic Capacity](https://nzmaths.co.nz/node/3483) (17)  N7/8 4.4 [Growing Pains](https://nzmaths.co.nz/node/3523) (18)  N7/8 4.4 [Fold and Crease](https://nzmaths.co.nz/node/3524) (19)  N7/8 4.4 [Pip’s Pay](https://nzmaths.co.nz/node/3525) (20)  NS&AT3.1 [The Power of Powers](https://nzmaths.co.nz/node/4111) (14-15) |

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| Solve missing factor problems by reversing,  e.g. 263 ? = 456 by  456  263 = ? | 6 🞏 = 222 by  222  6 = 37  🞏 9 = 657 by  657  9 = 73  2.4 🞏 = 20.64 by  20.64 2.4 = 8.6  🞏 0.63 = 23.184 by  23.184  0.63 = 36.8 | ***Teaching Number Sense and Algebraic Thinking (Book 8)***  [Reversals for Multiplication and Division](https://nzmaths.co.nz/node/993) (10) | Know what happens when a whole number or decimal is multiplied or divided by a power of ten,  e.g. 4.57 × 100 = 457,  6.3 ÷ 0.9 = 7 |  |
| Know the divisibility rules for 2,3,4,5,6,8,9 and 10,  e.g. 568 is divisible by 4 since 68 is divisible by 4 |
| Use estimation to check the answers to multiplication and division problems. | 48 32  50 30 = 1500  196 14  200 14 = 2800  2718  9  2700  10 = 27  3283  49  3300  50 = 4966  7.7 4.3  8 4 = 32  57.6  8.2  56 8 = 7  591.61  88.3  600  90  7 | ***Teaching Number Sense and Algebraic Thinking (Book 8)***  [Checking Multiplication by Estimation](https://nzmaths.co.nz/node/973) (11)  [Checking Division by Estimation](https://nzmaths.co.nz/node/958) (11)  ***Figure It Out***  N 3-4 [Hard Times](https://nzmaths.co.nz/node/3262) (15)  N 3-4 [Multiplication Roundabouts](https://nzmaths.co.nz/node/3263) (16)  BF 3-4 [Trying Times](https://nzmaths.co.nz/node/2904) (2)  BF 3-4 [Eleventh Heaven](https://nzmaths.co.nz/node/2905) (3)  BF 3-4 [Napier’s Bones](https://nzmaths.co.nz/node/2910) (8-9)  N 7/8 L 2 [Planting with the Whānau](https://nzmaths.co.nz/node/3374) (6-7)  N 7/8 L 2 [Fun Times](https://nzmaths.co.nz/node/3379) (13)  N 7/8 L 2 [Divisive Tactics](https://nzmaths.co.nz/node/3409) (14)  NS 7/8 1 L [It pays to win](https://nzmaths.co.nz/node/4198) (18)  NS 7/8 1 L [Grocery Grapplers](https://nzmaths.co.nz/node/4200) (20)  NS 7/8 1 L [Division Dilemmas](https://nzmaths.co.nz/node/4206) (24)  NS&AT3.2 [Pizza Split](https://nzmaths.co.nz/node/4122) (6-7)  N3 [Standing Room Only](https://nzmaths.co.nz/node/3148) (4)  N 3-4 [Division Delights](https://nzmaths.co.nz/node/3265) (18)  N 3-4 [Digital Dilemmas](https://nzmaths.co.nz/node/3266) (19) | Perform short multiplication and division with whole numbers and decimals, using standard algorithms, and explain how they work.  Perform multiplication of multi-digit whole numbers and decimals, using a standard algorithm, and explain how it works |  |
| Identify highest common factors and least common multiples,  e.g. Highest common factor of 48 and 64 is 8 |