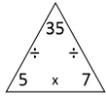


Multiplication

Year 3	Year 4	Year 5	Year 6
<ul style="list-style-type: none"> recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables. write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and corresponding problems in which n objects are connected to m objects. 	<ul style="list-style-type: none"> recall multiplication and division facts for multiplication tables up to 12×12. use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers. recognise and use factor pairs and commutativity in mental calculations. multiply two-digit and three-digit numbers by a one-digit number using formal written layout. solve problems involving multiplying and adding, including using the distributive law and harder multiplication problems such as which n objects are connected to m objects. 	<ul style="list-style-type: none"> identify multiples and factors, including finding all factor pairs and common factors of two numbers. know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. establish whether a number up to 100 is prime and recall prime numbers up to 19. multiply numbers up to 4 digits by a one- or two-digit number using an efficient written method, including long multiplication for two-digit numbers. multiply and divide numbers mentally drawing upon known facts. multiply whole numbers and those involving decimals by 10, 100 and 1000. recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3). solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. 	<ul style="list-style-type: none"> multiply multi-digit numbers up to 4 digits by a two-digit whole number using the efficient written method of long multiplication. perform mental calculations, including with mixed operations and large numbers. identify common factors, common multiples and prime numbers. use their knowledge of the order of operations to carry out calculations involving the four operations. solve problems involving addition, subtraction, multiplication and division, deciding which operations to use and why. use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. multiply numbers up to two decimal places by one-digit numbers.

- Know multiplication facts for 3x, 4x and 8x tables; through doubling, connect the 2x, 4x, 8x tables.
- Use triangular multiplication and division cards for 2x, 3x, 4x, 5x, 8x, and 10x tables.



- Know $5 \times \square = 35$; $\square \times 7 = 35$; $35 \div 7 = \square$; $35 \div 5 = \square$
- Understand commutativity and associativity for multiplication i.e. $4 \times 7 \times 5 = 4 \times 5 \times 7 = 5 \times 4 \times 7$; $(4 \times 5) \times 7 = 4 \times (5 \times 7)$.
- Derive other facts i.e. $3 \times 2 = 6$, so $30 \times 2 = 60$.
- Continue to use arrays to multiply.
- Multiply 2 digit numbers by 1 digit numbers by partitioning .
e.g. $15 \times 5 = 75$ as 10×5 and 5×5
- Use measuring and scaling contexts e.g. four times as high etc.
- Multiply a single digit by 10 or 100 using a place value table.
- Solve problems and missing number problems. $\square \times 8 = 32$ $6 \times \square = 24$
e.g. *3 hats and 4 coats – How many different outfits?*

- Know times tables to 12×12 .
- Derive other facts from known times tables, extending to 3-digit numbers e.g. If $2 \times 3 = 6$ then $600 \div 3 = 200$
- Multiply by 1 and 0.
- Multiply three numbers, e.g. $2 \times 3 \times 5$ using associative law i.e. $(2 \times 3) \times 5 = 6 \times 5 = 30$ or $2 \times (3 \times 5) = 2 \times 15 = 30$.
- Doubling all numbers to 50 and multiples of 10 to 500.
- Find factor pairs of numbers to 50.
- Use expanded multiplication, moving to short multiplication method (by the end of the year) with up to 3 digits by 1 digit.

Expanded multiplication:

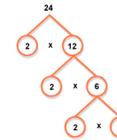
24	256
$\times 6$	$\times 8$
24 (6 x 4)	48 (8 x 6)
<u>120</u> (6 x 20)	400 (8 x 50)
<u>144</u>	<u>1600</u> (8 x 200)
	<u>2048</u>
	1

Short multiplication:

24×6 becomes	342×7 becomes
$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ 2 \end{array}$	$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \\ 21 \end{array}$
Answer: 144	Answer: 2394

- Solve missing number type problems as in year 2 but with appropriate numbers.
- Use methods within problem solving contexts, e.g. money and measures, involving two-step problems e.g. choices on a menu.

- Find all factor pairs for numbers to 100 and know that numbers with a single pair of factors are prime and numbers with an odd number of factors are square.
- Solve missing number type problems $_ \times _ = 28 = 7 \times 4$, by using knowledge of factors that make 28.
- Know primes to 19 (and work out up to 100) and use prime factors, e.g. $24 = 2 \times 2 \times 2 \times 3$.
- Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3).
- Multiply integers and decimals by 10 and 100 and 1000.
- Solve problems that require an understanding of the meaning of the equals sign, e.g. $17 + 7 = 3 \times \square$ and $33 = 5 \times \square$
- Use the expanded method for multiplying with up to 4 digits by 2 digit numbers and use the short multiplication method to multiply 4 digit numbers by 1 digit numbers.



Expanded method:

$$\begin{array}{r} 2453 \\ \times 27 \\ \hline 21 \quad (7 \times 3) \\ 350 \quad (7 \times 50) \\ 2800 \quad (7 \times 400) \\ 14000 \quad (7 \times 2000) \\ 60 \quad (20 \times 3) \\ 1000 \quad (20 \times 50) \\ 8000 \quad (20 \times 400) \\ \hline 40000 \quad (20 \times 2000) \\ \hline 66231 \\ 111 \end{array}$$

- Towards the end of the year, introduce the long multiplication method for multiplying 2 digit numbers by 2 digit numbers ready for year 6.

$$\begin{array}{r} 24 \times 16 \text{ becomes} \\ \begin{array}{r} 24 \\ \times 16 \\ \hline 240 \\ 144 \\ \hline 384 \end{array} \\ \text{Answer: 384} \end{array}$$

Short multiplication:

$$\begin{array}{r} 2741 \times 6 \text{ becomes} \\ \begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \\ 42 \end{array} \\ \text{Answer: 16446} \end{array}$$

- Use a range of mental strategies for multiplication. E.g.
 - Using rounding for near multiples of 10 and 100 e.g. $58 \times 9 = (58 \times 10) - (58 \times 1)$
 - Use factors to multiply mentally with jottings e.g. $16 \times 18 = 8 \times 2 \times 9 \times 2 = 8 \times 9 \times 2 \times 2 = 72 \times 4 = 288$
 - Using doubling and halving to make a calculation simpler e.g. $25 \times 18 = 50 \times 9 = 450$

- Continue to use short multiplication with up to four-digit numbers by a one-digit number.
- Use long multiplication with up to four-digit numbers multiplied by two-digit integers.

124×26 becomes	$2^3 4^2 5^3$
$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \end{array}$	$\begin{array}{r} 17171 \\ \times 27 \\ \hline 49060 \\ 66231 \\ \hline 11 \end{array}$

Answer: 3224

- Introduce multiplication of decimals (a one-digit number with up to two decimal places by a whole number).
- Use the order of operations: BODMAS (Brackets, Order, Division, Multiplication, Addition, Subtraction) when calculating.
E.g. $3 \times (8 + 10) - 15 \div 5 = 51$