


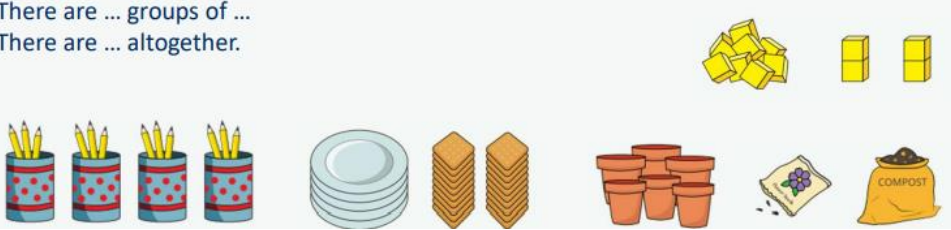


Walton Oak – Multiplication Calculation Policy

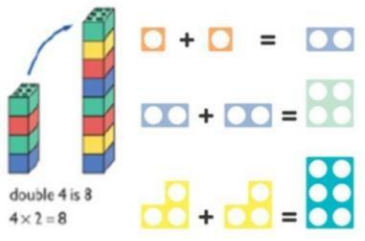

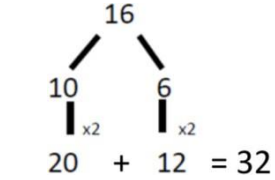
Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

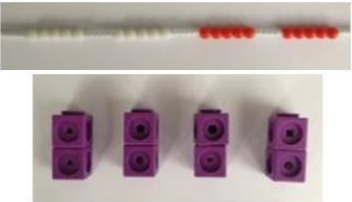
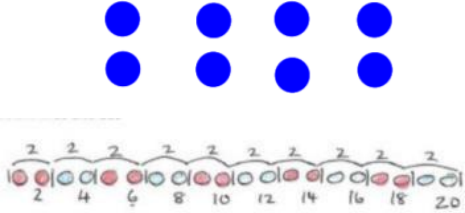
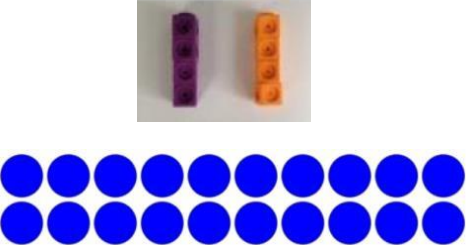
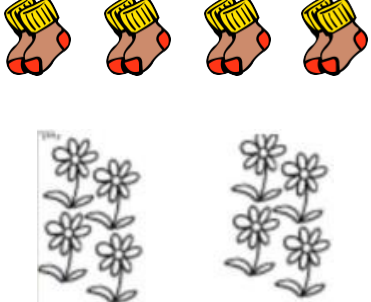
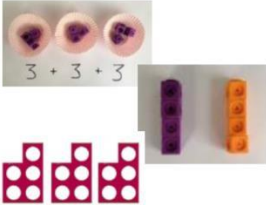
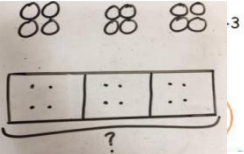

Nursery	
Fluency	End of year expectations
	Continue with counting and subitising skills as a foundation for later work on equal groups. (see addition and subtraction sections)

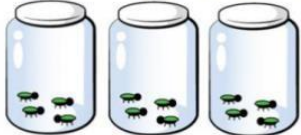



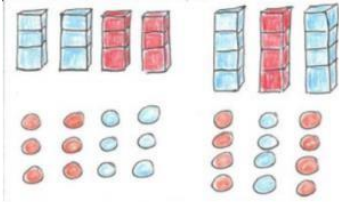
Reception	
Fluency	End of year expectations
Double to 10 Make equal groups	Have a deeper understanding of number to 10, including the composition of each number Subitise (recognise quantities without counting) up to 5 Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 and some number bonds to 10, including double facts. Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

Objective and strategy	Key representations
<p>Double to 10</p>	<p>Double ... is is double ...</p> 
<p>Make equal groups</p>	<p>There are ... groups of ... There are ... altogether.</p> 

Year 1	
Fluency	End of year expectations
Count in twos, fives and tens from different multiples e.g. 6, 8, 10, 12 etc Emphasise number patterns Count in multiples of 2s, 5s and 10s starting on multiples to highlight pattern recognition Double numbers and quantities $10 \times 2 = 20$ 10 times 2 10 groups of 2 10 lots of 2	0×0 <ul style="list-style-type: none"> Solve single step practical problems involving multiplication Numbers up to 20 Use concrete objects, pictorial representations Double numbers and quantities Make connections between arrays, number patterns and counting in twos, fives and tens

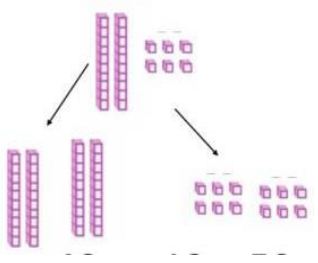
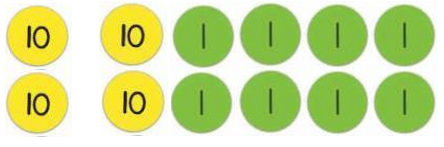
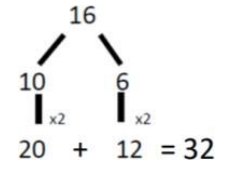
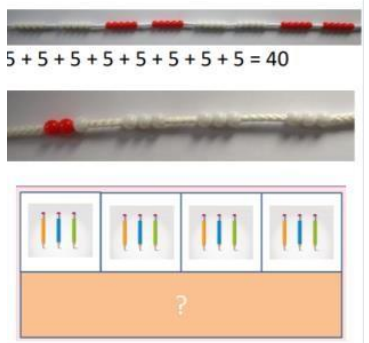
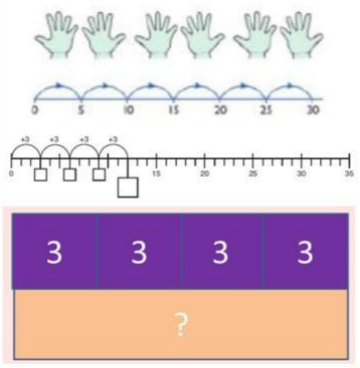
Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
Doubling	Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling 	Draw pictures to show how to double numbers Double 4 is 8 	Partition a number and then double each part before recombining it back together. 

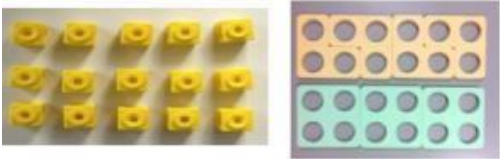
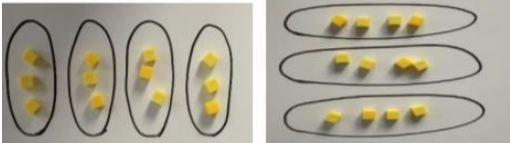
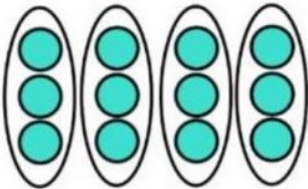
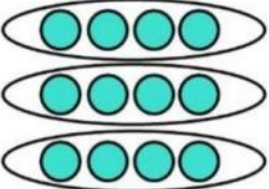

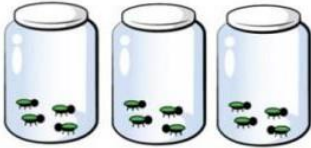

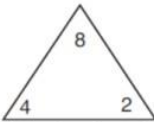
Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
<p>Counting in multiples</p>	<p>Count the groups as children are skip counting, children may use their fingers as they are skip counting</p> 	<p>Children make representations to show counting in multiples.</p> 	<p>Count in multiples of a number aloud. Write sequences with multiples of numbers.</p> <p>2, 4, 6, 8, 10</p> <p>5, 10, 15, 20, 25, 30</p>
<p>Making equal groups and counting the total</p>	<p>Use manipulatives to create equal groups.</p> 	<p>Draw and make representations</p> 	<p>$4 \times 2 = 8$</p> <p>$2 \times 4 = 8$</p>
<p>Repeated addition</p>	<p>Use different manipulatives to add equal groups</p> 	<p>Use pictures including number lines to solve problems</p> <p>There are 3 sweets in one bag. How many sweets are in 5 bags altogether?</p> 	<p>Write addition sentences to describe objects and pictures.</p>  <p>$2 + 2 + 2 + 2 + 2 = 10$</p>

	<p>There are 3 equal groups, with 4 in each group.</p> 		
<p>Objective and strategy</p>	<p>Concrete (build it)</p>	<p>Pictorial (draw it)</p>	<p>Abstract (write it)</p>
<p>Understanding arrays</p>	<p>Use objects laid out in arrays to find the answers to 2 lots of 5, 3 lots of 2 etc.</p>  	<p>Draw representations of arrays to show understanding</p>  	<p>$3 \times 2 = 6$</p> <p>$2 \times 5 = 10$</p>



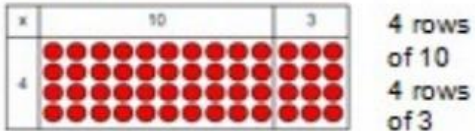
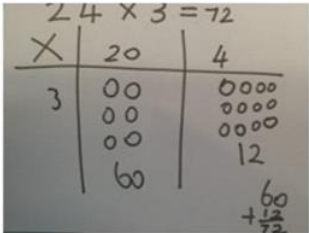
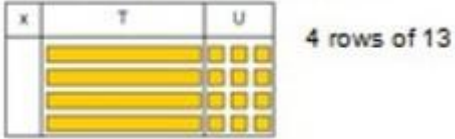
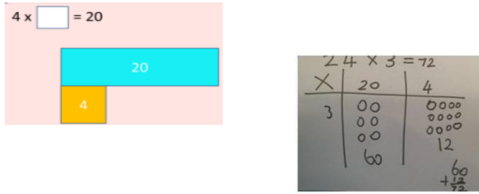
Year 2	
Fluency	End of year expectations
<p>Count in twos, threes, fives from zero and tens from any number e.g. 6, 8, 10, 12 etc</p> <p>Emphasise number patterns</p> <p>Introduction to Multiplication tables.</p> <p>Practise to become fluent in multiplication facts for 2, 5 and 10</p> <p>Solve multiplication problems mentally</p> <p>$10 = 2 \times 5$ $5 \times 2 = 10$ $2 + 2 + 2 + 2 + 2 = 10$ $10 = 5 + 5$</p>	<p>Understand multiplication as repeated addition</p> <p>Understand and solve problems involving arrays</p> <p>Calculate mathematical statements for multiplication within the tables and write them using symbols: \times and $=$</p> <p>Ensure children understand that multiplication is commutative (can be done in any order)</p> <p>Understand that multiplication and division are inverse operations</p>

Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
<p>Doubling</p>	<p>Model doubling using dienes and PV counters</p> <p>Double 26 is 52</p> 	<p>Draw pictures and representations to show how to double numbers</p> <p>Double 24 is 48</p> 	<p>Partition a number and then double each part before recombining it back together.</p> 
<p>Repeated Addition</p> <p>(counting in multiples of 2, 3, 4, 5, 10 from 0)</p>	<p>Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar models.</p> 	<p>Number lines, counting sticks and bar models should be used to show representation of counting in multiples.</p> 	<p>Write sequences with multiples of numbers.</p> <p>0, 2, 4, 6, 8, 10</p> <p>0, 3, 6, 9, 12, 15</p> <p>0, 5, 10, 15, 20, 25, 30</p>

<p>Multiplication is commutative</p>	<p>Create arrays using counters, cubes and Numicon</p>  <p>Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.</p> 	<p>Use representations of arrays to show different calculations and explore commutativity.</p>  	<p> $12 = 3 \times 4$ $12 = 4 \times 3$ </p> <p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  <p> $5 + 5 + 5 = 15$ $3 + 3 + 3 + 3 + 3 = 15$ $5 \times 3 = 15$ $3 \times 5 = 15$ </p>
<p>Using the Inverse</p> <p><i>(This should be taught alongside division, so pupils learn how they work alongside each other)</i></p>	<p>Use manipulatives to build understanding of the inverse.</p> <p> $4 \times 3 = 12$ $12 \div 3 = 4$ </p>  	<p>Use pictures and fact family triangles to build understanding.</p>  <p> <input type="text"/> \times <input type="text"/> = <input type="text"/> <input type="text"/> \times <input type="text"/> = <input type="text"/> <input type="text"/> \div <input type="text"/> = <input type="text"/> <input type="text"/> \div <input type="text"/> = <input type="text"/> </p>	<p>Show all 8 related fact family sentences.</p> <p> $2 \times 4 = 8$ $4 \times 2 = 8$ </p> <p> $8 \div 2 = 4$ $8 \div 4 = 2$ </p> <p> $8 = 2 \times 4$ $8 = 4 \times 2$ </p> <p> $2 = 8 \div 4$ $4 = 8 \div 2$ </p>

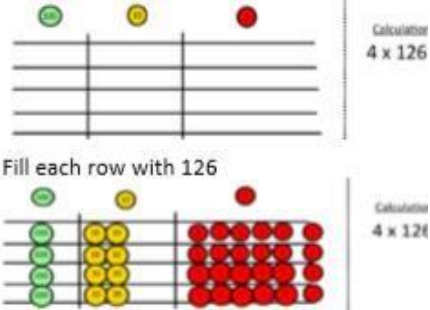
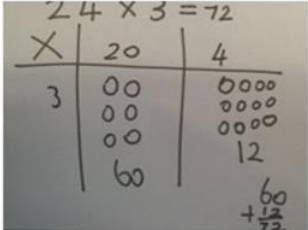
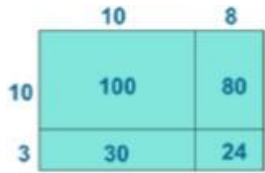


Year 3	
Fluency	End of year expectations
Count from 0 in multiples of 4, 8, 50 and 100	TO x 0
Use multiples of 2, 3, 4, 5, 8, 10, 50 and 100	Develop reliable written methods
Practise mental recall of multiplication tables – 3, 4 and 8x times tables	Understand and solve scaling problems
Connect the 2, 4 and 8 times tables using doubling	Solve problems involving multiplication including correspondence (a close similarity, connection or equivalence)
Develop efficient mental methods using commutativity and multiplication facts to derive related facts e.g. $4 \times 5 \times 12 = 12 \times 4 \times 5 = 12 \times 20$	Recall and use multiplication facts for the 3, 4 and 8 multiplication tables
$4 \times 5 = 20$ $5 \times 4 = 20$ $20 \div 5 = 4$ $20 \div 4 = 5$	Write and calculate mathematical statements for multiplication using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
Multiply a 2-digit number by a 1-digit number – no exchange and with exchange	Solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

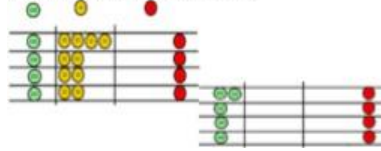
Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)						
<p>Grid method</p>	<p>Show the links with arrays to first introduce the grid method, use counters or place value counters.</p> 	<p>Children can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown below.</p> 	<p>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.</p> <table border="1" data-bbox="1629 505 1839 565"> <tr> <td>x</td> <td>30</td> <td>5</td> </tr> <tr> <td>7</td> <td>210</td> <td>35</td> </tr> </table> <p>$210 + 35 = 245$</p>	x	30	5	7	210	35
x	30	5							
7	210	35							
<p>Grid method</p>	<p>Move onto base ten to move towards a more compact method.</p> 	<p>Bar models are used to explore missing numbers</p>	<table border="1" data-bbox="1612 919 1871 995"> <tr> <td>x</td> <td>30</td> <td>5</td> </tr> <tr> <td>7</td> <td>210</td> <td>35</td> </tr> </table> <p>$210 + 35 = 245$</p>	x	30	5	7	210	35
x	30	5							
7	210	35							
<p>Grid method</p>									



Year 4	
Fluency	End of year expectations
Count in multiples of 6, 7, 9, 25 and 1000	TO x O HTO x O
Recall and use multiplication facts up to 12 x 12 with increasing fluency	Multiplying three numbers 3 x 2 x 6
Derive multiplication facts with up to three-digits	Solve two-step problems
Recognise and use factor pairs and commutativity	Multiplying by 0 and by 1
Use the distributive law	Develop fluency in short multiplication using formal written layout
Combine knowledge of number facts and rules of arithmetic to solve mental and written calculations e.g. $2 \times 6 \times 5 = 10 \times 6$	Solve problems involving multiplication including using the distributive law, integer scaling problems and harder correspondence problems
Multiple a 2 or 3 digit number by a 1 digit number	Recall multiplication facts for multiplication tables up to 12x12
	Recognise and use factor pairs and commutativity in mental calculations

Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
<p>Grid method recap from year 3 for 2 digits x 1 digit</p> <p>Move to multiplying 3 digit numbers by 1 digit. (year 4 expectation)</p>	<p>Use place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows</p> 	<p>Children can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking</p> 	<p>Multiply by a 2 digit number showing the different rows within the grid method.</p> 

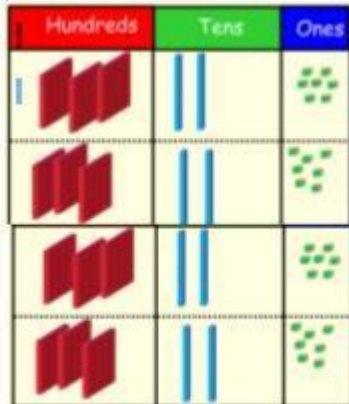
Add up each column, starting with the ones making any exchanges needed



Then you have your answer.

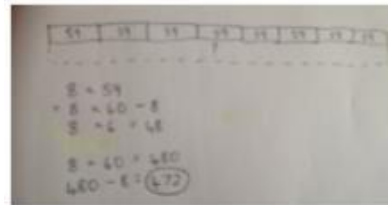
Column multiplication

Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. $321 \times 2 = 642$



It is important at this stage that they always multiply the ones first. The corresponding long multiplication is modelled alongside.

x	300	20	7
4	1200	80	28



Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.



$$\begin{array}{r}
 327 \\
 \times 4 \\
 \hline
 28 \\
 80 \\
 1200 \\
 \hline
 1308
 \end{array}$$

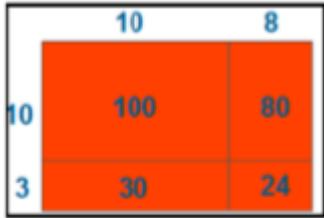

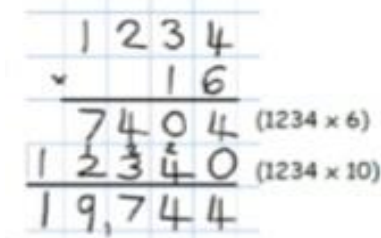


	3	2	7
x			4
	1	3	0
		1	2
			8

This may lead to a compact method.



Year 5	
Fluency	End of year expectations
Count forwards in steps of powers of 10 from any given number up to 1 000 000	ThHTO x O ThHTO x TO
Practise and extend use of formal written method of short multiplication	Identify multiples and factors including finding all factor pairs of a number, and common factors of two numbers
Apply all multiplication tables frequently. Commit them to memory and use them confidently to make larger calculations	Solve problems involving all operations where larger numbers are used
Multiply numbers mentally drawing upon known facts	Multiply whole numbers and those involving decimals by 10, 100 & 1000
Square and cube numbers	Understand and use multiplication and division as inverses including in problems involving missing numbers and balancing equations
Multiply by 10, 100 and 1000	Solve problems involving multiplication and division including scaling by simple fractions
	Know and use the vocabulary of prime numbers, prime factors and composite (non-prime)
	Recognise and square and cube numbers and associated notation
	Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
	Multiply proper fractions and mixed numbers by whole numbers

Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
<p align="center">Column multiplication</p>	<p>Manipulatives may still be used with the corresponding long multiplication modelled alongside.</p>	<p>Continue to use bar modelling to support</p> 	<p>18 x 3 on the first row (8 x 3 = 24, carrying the 2 for 20, then 1 x 3)</p> <p>18 x 10 on the 2nd row. Show multiplying by 10 by putting zero in the ones column first</p>  



Year 6	
Fluency	End of year expectations
Undertake mental calculations with increasingly large numbers Continue to use all multiplication tables to calculate mathematical statements in order to maintain fluency Multiply numbers up to 4 digits by a 2-digit number Multiply by 10, 100 and 1000 Order of operations Multiply decimals by integers Multiply fractions by fractions	Multiply multi-digit numbers up to four-digits by a two-digit whole number Multiply single –digit numbers with up to two-decimal places by whole numbers Identify common factors, common multiples and prime numbers Solve problems including multiplication Multiply numbers by 10, 100 and 1,000 Multiply simple pairs of proper fractions, writing the answer in its simplest form. Solve problems involving the calculations of percentages Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts

Short Multiplication	Long multiplication Whole numbers	Long multiplication Decimal numbers
$ \begin{array}{r} 1324 \\ \times \quad 6 \\ \hline 7944 \\ \hline 112 \end{array} $	$ \begin{array}{r} 1324 \\ \times \quad 26 \\ \hline 7944 \\ \cancel{26} \cancel{48} \cancel{0} \\ \hline 34424 \\ \hline 111 \end{array} $	$ \begin{array}{r} 3.24 \\ \times \quad 26 \\ \hline 19.44 \\ \cancel{64} \cancel{80} \\ \hline 84.24 \\ \hline 11 \end{array} $

