



Ashfield Primary School – multiplication calculation policy

Our aim is for children to use mental methods when appropriate but for calculations that they cannot solve in their heads, we aim to teach children to use an appropriate written method which they can use accurately and confidently. These stages show how to build up to a compact, efficient method of multiplication which they can use accurately. Multiplication should be taught alongside its inverse, division. **Please see the attached appendix for further examples of concrete, pictorial and abstract methods**



	Year group
<p>Pre-requisites:</p> <ul style="list-style-type: none"> - Uses some number names and number language accurately. - Recites numbers in order to 10. <p>Knows that numbers identify how many objects are in a set.</p> <ul style="list-style-type: none"> - Beginning to represent numbers using fingers, marks on paper or pictures. - Compare sets and say when they have the same number. <p>Key vocabulary:</p> <p>More, not enough, too much, gone, all gone, bigger, hotter, older, faster, smaller, colder, younger, slower, lots, fewer, more than, less than, same, big, long, hot, old, far fast, small, short, cold, young, new, slow.</p> <p>Compare, double, pair, count out, how much? How many? total Pattern, puzzle, answer, right, wrong, count, sort, group, set, match, same, different, list, What could we try next? How did you work it out?</p>	<p>Reception</p> <p>Children need to learn the concept and language of amounts. They also need to have one to one correspondence and learn more advanced counting skills.</p> <p>Opportunities to develop multiplication skills begin in Foundation Stage 1, when the link between division and multiplication will be explored with talk about sharing during snack and provision activities. Songs will be learned which promote counting in multiples. This learning will continue in Foundation Stage 2 with looking at arrays, often found in everyday situations.</p> <p>For example:</p>  <p>Children should first learn to count by rote. Then children should learn to count objects accurately using one to one correspondence.</p> <p>Solve problems involving doubling.</p> <p>Children should engage in a variety of counting songs and rhymes and practical activities. Children should begin to solve problems involving doubling.</p>  <p>'Two bears for you and two bears for me. How many altogether?' Children should record their work using marks they can explain. There is no requirement to use the standard symbols until Year 1 (+, -, =)</p>

Ashfield Primary School – multiplication calculation policy

Pre-requisites:

- count reliably with numbers from 1 – 20 and place them in order
- say 1 more or less than a given number
- count on or back to find answers
- have practical experience of doubling

Key vocabulary:

Odd, even, count, count in 2s, 5s, 10s, how many times, lots of, groups of, multiple of, multiply by, multiply, repeated addition, array, row, column, double, equal, altogether

Year 1

Count in 2s, 5s and 10s

Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Children need plenty of opportunities to count in equal groups of 2s, 5s and 10s using concrete objects and pictorial representations.



Children should be given lots of experience multiplying using repeated addition using concrete objects and pictorial representations. Children should use addition (+) and the equals (=) signs to record their calculations.

e.g. "How many legs on four teddies?"



$$2 + 2 + 2 + 2 = 8$$

There are 3 sweets in a bag. How many sweets in 3 bags?



$$2 + 2 + 2 = 6$$

Children should be shown how to use arrays to multiply by 2, 5 and 10 with support.

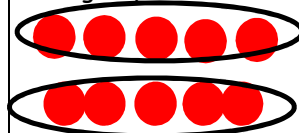


2 x 5 or 2 times five is the same as



5 x 2 or 5 times 2

'Five groups of two faces. How many altogether? 2, 4, 6, 8, 10.'



'Two groups of five. How many altogether? 5, 10.'

Ashfield Primary School – multiplication calculation policy

Pre-requisites:

- count in 2s, 5s and 10s
- have experience of repeated addition
- understand how to count equal groups of 2, 5 and 10 using objects and pictorial representations
- understand that division is the inverse of multiplication.

Key vocabulary:

Odd, even, count, count in 2s, 5s, 10s, how many times, lots of, groups of, multiple of, multiply by, multiply, repeated addition, array, row, column, double, equal, altogether

Year 2

Recall and use multiplication facts for 2, 5 and 10 x tables.

Calculate mathematical statements for multiplication using multiplication (x) and equals (=) signs.

Solve problems involving multiplication using materials, arrays, repeated addition, mental methods and multiplication facts.

Children should combine groups (repeated addition) as shown in Year 1, but should vary the mathematical language they use and also write the associated number sentences. Children should be taught that multiplication can be done in any order (commutative).



"3
"3
"3
"10 +
"3 x



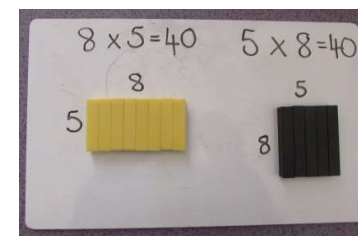
groups of 10 is 30"
groups of 10 is 30"
times 10 is 30"
 $10 + 10 = 30$ "
 $10 = 30$ "

Children should use Numicon to find $5 = 40$

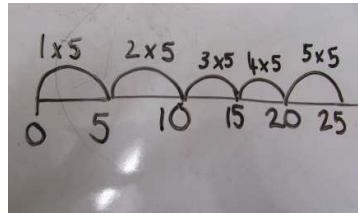
Children should also be taught that multiplication statements like 8×5 can be shown using arrays. Children should start by using concrete objects like Cuisenaire rods and be reminded that they can use either the 5 or 8 rods to find the correct answer.

They should also be taught that they can show the multiplication statement both ways around ($8 \times 5 = 40$ and $5 \times 8 = 40$).

After using concrete objects like Cuisenaire rods and Numicon, children should be shown how to multiply by drawing their own blank number lines. Make the link to repeated addition clear, e.g. $5 \times 5 = 25$



Ashfield Primary School – multiplication calculation policy



\times and $=$ signs to be introduced with missing numbers

e.g. $\square \times 2 = 14$
 $7 \times \square = 14$
 $7 \times 2 = \square$

$$\begin{aligned} 14 &= 7 \times \square \\ 14 &= \square \times 2 \\ \square &= 7 \times 2 \end{aligned}$$

Ashfield Primary School – multiplication calculation policy

Pre-requisites:

- count in 2s, 3s, and 5s
- understand repeated addition is a form of multiplication.
- recall multiplication facts for the 2, 5 and 10x tables.
- calculate mathematical statements for multiplication and use the 'x' sign accurately.
- understand that multiplication of two numbers can be done in any order (commutative)

Key vocabulary:

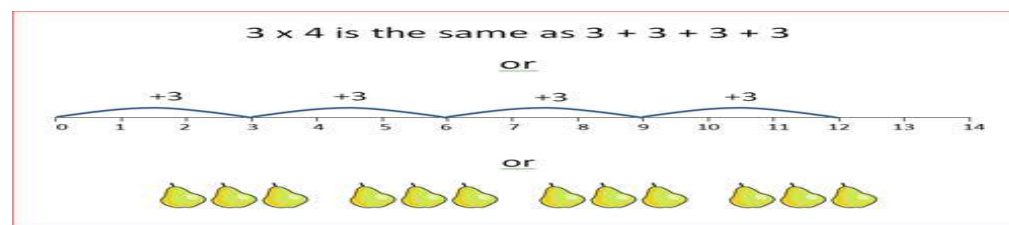
As above
product, multiple of four, eight, fifty and one hundred, scale up

Year 3

Recall and use multiplication facts for the 3, 4 and 8x tables (and continue to practise the 2, 5 and 10x tables).

Calculate mathematical statements for multiplication using the x tables that they already know, including for a two-digit number times a one-digit number progressing to formal written methods.

Continue to use number lines and arrays to support multiplication, as appropriate (see Y2 guidance).



Children should be introduced to the formal column method with place value or base 10 – stage 1 no regrouping.

Example: 3×23

To progress to:

1	5	X	3	=	4	5
		X	3			
1	0	3	0			
	5	1	5			

Ashfield Primary School – multiplication calculation policy

Make 23, 3 times. See how many ones, then how many tens



Children to represent the counters in a pictorial way

Tens	Ones
6	9

When multiplying by units, do this way round.

Children should use their secure knowledge of place value of two-digit numbers to multiply a two-digit number by a one-digit number. Children should be shown how to partition the two-digit number into tens and ones and multiply both separately.

Include T and O above the two-digit number to serve as a reminder of the place value of digits they are multiplying.

They will use partitioning when first calculating 2 digits by 1 digit:

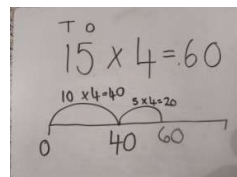
e.g.

$$15 \times 4 = 60$$

$$10 \times 4 = 40$$

$$5 \times 4 = 20$$

$$40 + 20 = 60$$



Children should also be shown how to use the partitioning method on a number line.

Ashfield Primary School – multiplication calculation policy

Children should progress towards using formal methods of columnar multiplication by the end of Year 3. By this point, children will already be familiar with 'exchanged' numbers into the tens or hundreds columns as part of their work on column addition. Children should be taught to multiply a two-digit number by a single digit number using column multiplication and should be reminded that they always begin calculating from the right hand column. Children can be shown the expanded form alongside the compact form, as taught when learning column addition.

Expanded form

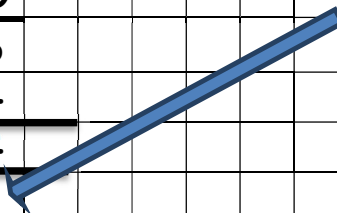
	1	6	x	4	=		6	4
		1	6					
	x		4					
+		2	4	(4 x 6)				
		4	0	(4 x 1 0)				
		6	4					

Children should learn to multiply using the multiplication tables that they already know e.g. x2, 5, 10, 3, 4 and 8.

Recording will be refined when moving on to formal short method (expectation for the end of Y3).

compact form

	1	6	x	4	=	6	4
	H	T	O				
		1	6				
x			4				
		6	4				
		2					



Ensure that the digit 'exchanged' is written underneath. Ensuring it is written in the correct column.

Ashfield Primary School – multiplication calculation policy

Pre-requisites:

- count in 3s, 4s and 8s
- have experience of multiplying a two-digit number by a one-digit number using formal written methods
- understand the value of each digit they are multiplying with

Key vocabulary:

As above

Multiplication facts (up to 12×12), inverse, derive

Year 4

Recall multiplication facts up to 12×12 .

Multiply three numbers together.

Multiply two and three-digit numbers by one-digit number using formal written layout.

[illegible]

Pupils may wish to return to grid method when 2 digit numbers move beyond teen numbers.

Some pupils will be ready to move on to expanded short multiplication for numbers beyond teens straight away, others will do this after revisiting the grid method.

Stop using place value columns in Year 4 when children confidently put the numbers in the correct place. This is in preparation and to stop the confusion when multiplying decimal numbers

Ashfield Primary School – multiplication calculation policy

Expanded form

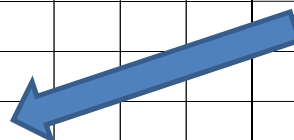
	4	6	x	4	=	1	8	4	
		4	6						
	x		4						
+		2	4	(4 x 6)					
	1	6	0	(4 x 40)					
	1	8	4						

Compact form

	6	6	x	4	=	2	6	4	
		6	6						
x			4						
	2	6	4						
	2	2							

Ensure that the digit 'exchanged' is written below the line. Ensuring it is written in the correct column.

Cross out exchanged numbers once added.



Ashfield Primary School – multiplication calculation policy

Continue to practise the formal method of short multiplication of a two-digit number by a one -digit number throughout Y4.

If children are confident, continue to develop short multiplication with three-digit numbers multiplied by a one-digit number.

If necessary, return to the grid method and/or expanded method first.

Step 1:

[illegible]

Ashfield Primary School – multiplication calculation policy

Step 2:

1	3	2	x	6	=	7	9	2									
				1	3	2											
			x			6											
					1	2	(6 x 2)										
				1	8	0	(6 x 3 0)										
				6	0	0	(6 x 1 0 0)										
				7	9	2											

Step 3:

1	3	2	x	6	=	7	9	2									
				1	3	2											
			x			6											
				7	9	2											
				1	1												

Ensure that the digit 'exchanged' is written below the line. Ensuring it is written in the correct column.

Cross out exchanged numbers once added.

Ashfield Primary School – multiplication calculation policy

Pre-requisites:

- count in 6s, 7s and 9s
- be able to multiply a two or three-digit number by a one-digit number using formal written methods

Key vocabulary:

As above

Factor pairs, composite numbers, prime number, prime factors, square number, cubed number, formal written method, order of operations, common factors, common multiples

Year 5

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. (Year 5)

Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Build on the work covered in Y4 with the formal method of short multiplication (two-digit number multiplied by a one-digit number).

When children are confident introduce multiplication by a two-digit number. If necessary, return to the grid method and/or expanded method first.

[illegible]

Ashfield Primary School – multiplication calculation policy

This leads into...

Compact long multiplication (formal method):

2	3	x	1	5	=	3	4	5			
E	s	t:	2	0	x	1	5	=	3	0	0
			2	3							
		x	1	5							
			1	1	5	(5	x	2	3)		
				±							
			2	3	0	(1	0	x	2	3)	
			3	4	5						

When ones place numbers are exchanged, this line is the column.

When multiplying by the ones place the exchanged number on this line in the correct column

Ashfield Primary School – multiplication calculation policy

When children are confident with long multiplication extend with three-digit numbers multiplied by a two-digit number

[illegible]

Prompts in brackets can be removed when children are confident.

Ashfield Primary School – multiplication calculation policy

Then four-digit numbers multiplied by a two-digit number

$$\begin{array}{|c|c|c|c|} \hline 1 & 2 & 0 & 7 \\ \hline \end{array} \times \begin{array}{|c|c|} \hline 3 & 6 \\ \hline \end{array} = \begin{array}{|c|c|c|c|} \hline 3 & 2 & 2 & 4 \\ \hline \end{array}$$

		1	2	0	7	
	×			3	6	
+		7	2	4	2	
		3	6	2	1	0
		4	3	4	5	2
	1					

When multiplying by the ones place the exchanged digit on this line in the correct column

When multiplying by the tens place the exchanged digit on this line in the correct column

Ashfield Primary School – multiplication calculation policy

Pre-requisites:

- count in 6s, 7s and 9s
- be able to multiply a two or three-digit number by a one-digit and a two-digit number using formal written methods

Key vocabulary:

As above

Factor pairs, composite numbers, prime number, prime factors, square number, cubed number, formal written method, order of operations, common factors, common multiples

Year 6



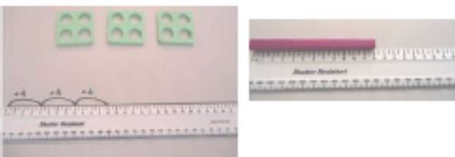
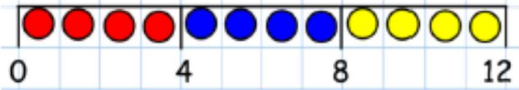
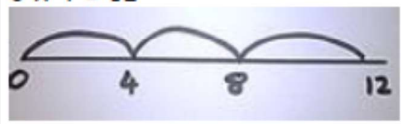

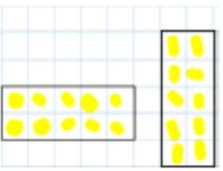
Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.

Continue to practise and develop the formal short multiplication method and formal long multiplication method with larger numbers and decimals (multiply one digit numbers with up to 2 decimal places by whole numbers. Again the emphasis is on practical use in measures and money) throughout Y6. Return to an expanded form of calculation initially, if necessary (see Y5 guidance).

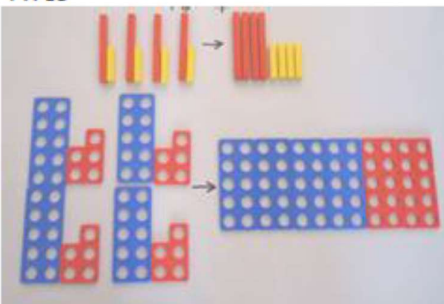
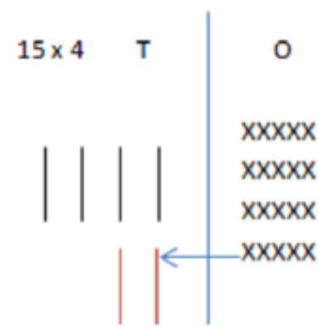
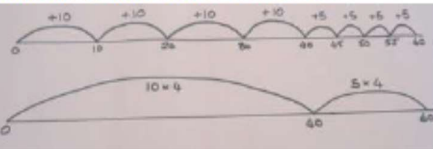

[illegible]

Ashfield Primary School – multiplication calculation policy


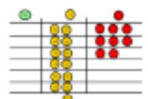
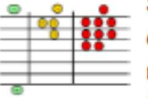
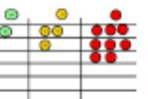
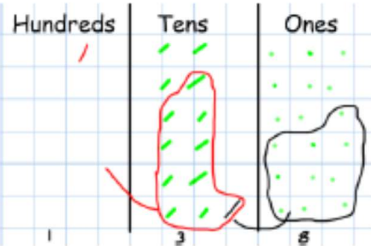
Appendix : Examples of concrete, pictorial and abstract

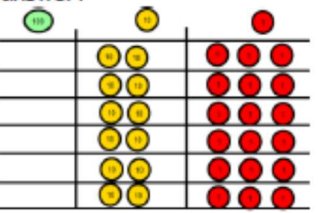
Concrete	Pictorial	Abstract
<p>Repeated grouping/repeated addition (does not have to be restricted to cubes) 3 x 4 or 3 lots of 4</p> 	<p>Children to represent the practical resources in a picture e.g.</p> <p>XX XX XX XX XX XX</p> <p>Use of a bar model for a more structured method</p> 	<p>3 x 4</p> <p>4 + 4 + 4</p>
<p>Use number lines to show repeated groups- 3 x 4</p> 	<p>Represent this pictorially alongside a number line e.g:</p> 	<p>Abstract number line</p> <p>3 x 4 = 12</p> 
<p>Use arrays to illustrate commutativity (counters and other objects can also be used) 2 x 5 = 5 x 2</p> 	<p>Children to draw the arrays</p> 	<p>Children to be able to use an array to write a range of calculations e.g.</p> <p>2 x 5 = 10 5 x 2 = 10 2 + 2 + 2 + 2 + 2 = 10 5 + 5 = 10</p>

Ashfield Primary School – multiplication calculation policy

<p>Partition to multiply (use numicon, base 10, Cuisenaire rods)</p> <p>4×15</p> 	<p>Children to represent the concrete manipulatives in a picture e.g. base 10 can be represented like:</p> <p>15×4 T O</p> 	<p>Children to be encouraged to show the steps they have taken</p> <p>4×15</p> <p>10 5</p> <p>$10 \times 4 = 40$ $5 \times 4 = 20$ $40 + 20 = 60$</p> <p>A number line can also be used</p> 				
<p>Formal column method with place value counters or base 10 (at the first stage- no exchanging) 3×23</p> <p>Make 23, 3 times. See how many ones, then how many tens</p> 	<p>Children to represent the counters in a pictorial way</p> <table border="1" data-bbox="680 802 932 989"> <tr> <th>Tens</th> <th>Ones</th> </tr> <tr> <td></td> <td></td> </tr> </table>	Tens	Ones			<p>Children to record what it is they are doing to show understanding</p> <p>3×23 $3 \times 20 = 60$ $20 \quad 3$ $3 \times 3 = 9$ $60 + 9 = 69$</p> <p>23 $\times 3$ <hr/> 69</p>
Tens	Ones					
<p>Formal column method with place value counters (children need this stage, initially, to understand how the column method works)</p>	<p>Children to represent the counters/base 10, pictorially e.g. the image below.</p>	<p>6×23</p> <p>$6 \times 3 = 18$ $6 \times 20 = 120$ $120 + 18 = 138$</p>				

Ashfield Primary School – multiplication calculation policy

<p>6×23</p>  <p>Step 1: get 6 lots of 23</p>  <p>Step 2: 6×3 is 18. Can I make an exchange? Yes! Ten ones for one ten....</p>  <p>Step 3: 6×2 tens and my extra ten is 13 tens. Can I make an exchange? Yes! Ten tens for one hundred...</p>  <p>Step 4- what do I have I each column?</p>		<p>The aim is to get to the formal method but the children need to understand how it works.</p> $ \begin{array}{r} 6 \times 23 = \\ 23 \\ \times 6 \\ \hline 138 \\ 1 \quad 1 \end{array} $
--	--	--

Fluency variation, different ways to ask children to solve 6×23:																					
<table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">23</td> <td style="padding: 2px 10px;">23</td> <td style="padding: 2px 10px;">23</td> <td style="padding: 2px 10px;">23</td> <td style="padding: 2px 10px;">23</td> <td style="padding: 2px 10px;">23</td> </tr> <tr> <td colspan="6" style="height: 20px; border: 1px solid black;"></td> </tr> <tr> <td colspan="6" style="text-align: center; padding-top: 5px;">?</td> </tr> </table> <p>With the counters, prove that $6 \times 23 = 138$</p> <p>Why is $6 \times 23 = 32 \times 6$?</p>	23	23	23	23	23	23							?						<p>Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week?</p> <p>Tom saved 23p three days a week. How much did he save in 2 weeks?</p>	<p>Find the product of 6 and 23</p> <p>$6 \times 23 =$</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> $= 6 \times 23$ </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> $\begin{array}{r} 6 \\ \times 23 \\ \hline \end{array}$ </div> <div style="text-align: center;"> $\begin{array}{r} 23 \\ \times 6 \\ \hline \end{array}$ </div> </div>	<p>What's the calculation? What's the answer?</p> 
23	23	23	23	23	23																
?																					