



MULTIPLICATION

Multiply with concrete objects, arrays and pictorial representations.

Year 1



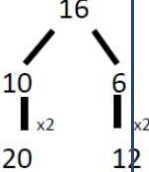

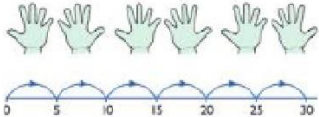

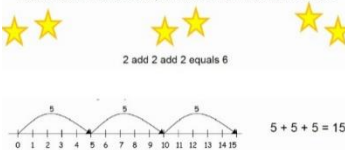

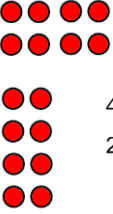
Double numbers up to 20.

Counting in multiples of 2, 5 and 10 to begin learning times tables.

Use repeated addition and arrays to represent number sentences.

Key Vocab:

Groups of, lots of, times, array, altogether, multiply, count

	Concrete	Pictorial	Abstract
Doubling	<p>Use practical activities to show how to double a number.</p> 	<p>Draw pictures to show how to double a number. Double 4 is 8</p> 	<p>Partition a number then double each part and recombine to show how to double a number.</p> 
Counting in multiples	<p>Count in multiples of different numbers, using concrete objects to show equal groups.</p> 	<p>Use a number line or pictures to continue to support counting in equal groups.</p> 	<p>Count in sequences of numbers aloud. Write sequences with multiples of numbers.</p> <p>2, 4, 6, 8, 10</p> <p>5, 10, 15, 20</p>
Repeated addition	<p>Use concrete objects to add equal groups.</p> <p>$2 + 2 + 2 + 2 = 8$</p> <p>$4 + 4 = 8$</p> 	<p>Use a number line to show adding on in equal sized jumps.</p> <p>There are 6 biscuits. How many biscuits are there?</p> <p>2 add 2 add 2 equals 6</p> 	<p>Record number sentences to show repeated addition.</p> <p>5×2</p> <p>$2+2+2+2+2$ or $5+5$</p>
Using arrays	<p>Create arrays using counters or cubes to show multiplication sentences.</p> <p>$3 \times 10 = 30$</p> <p>$10 \times 3 = 30$</p> 	<p>Draw arrays in different orientations to show different number</p>  <p>$4 \times 2 = 8$</p> <p>$2 \times 4 = 8$</p>	<p>Understand that 5×2 can be calculated as 5 lots of 2, 2 lots of 5 as well as reinforcing repeated addition.</p> <p>5×2 or 2×5</p> <p>$2+2+2+2+2$ or $5+5$</p>

Children should

- Have access to a range of equipment such as numicon, number lines, bead strings, 100 squares, cubes & counters.
- Have opportunities to multiply using concrete objects in a range of real life contexts e.g. multiplying the number of teddies, number of children etc.
- Be exposed to a variety of models and images to support their learning.
- Read and write number sentences using the x and = signs.
- Understand the = as "equals" or "balanced" and not as "the answer".
- Solve one step problems.



MULTIPLICATION

Multiply using arrays and repeated addition.

Year 2

Create arrays to represent multiplication number sentences.

Recognise that multiplication can be done in any order.



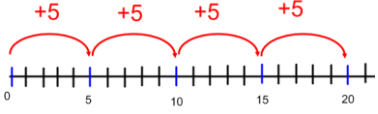
Relate multiplication to repeated addition.

Represent multiplication on a number line & use this to solve problems.

Key Vocab:

Groups of, lots of, times, array, altogether, multiply, count.

Multiplied by, column, row, repeated addition, commutative, sets of, equal groups, as big as, once, twice, three times etc.

	Concrete	Pictorial	Abstract
Creating arrays and relating to repeated addition.	<p>Continue to create arrays using counters or cubes to show multiplication sentences.</p>  <p>$2 \times 6 = 12$ $6 \times 2 = 12$ $3 \times 4 = 12$ $4 \times 3 = 12$</p>	<p>Draw arrays in different orientations to reinforce understanding of the commutative law and the relationship between multiplication and repeated addition.</p>  <p>$5 + 5 + 5 = 15$ $3 + 3 + 3 + 3 + 3 = 15$ $5 \times 3 = 15$ $3 \times 5 = 15$</p> <p>Represent multiplication on a number line as equal jumps.</p> <p>$4 \times 5 = 20$</p> 	<p>Record multiplication as number sentences.</p> <p>Recognise that</p> <p>$4 \times 3 = 3 \times 4$</p>

Children should

- Represent number sentences as arrays & on pre-drawn and self-drawn number lines.
- Understand the relationship between multiplication & repeated addition.
- Understand the commutative law & know that multiply and divide are inverse operations.
- Begin to use counting and times table facts to solve problems mentally. (2x, 5x and 10x).
- Have experience of applying these methods to a range of different contexts including worded multiplication problems & missing number problems.
- Use x and = signs to calculate mathematical statements for multiplication.



MULTIPLICATION

Multiply 2 digit numbers by a single digit number.

Year 3

Introduce grid method for multiplying 2 digits by 1 digit.

Move on to expanded & compact column methods to introduce short multiplication.

Encourage the use of times tables facts to support mental calculation.

Key Vocab:

Groups of, lots of, times, array, altogether, multiply, count, multiplied by, column, row, repeated addition, commutative, sets of, equal groups, as big as, once, twice, three times.
Partition, grid method, multiple, product, tens, ones, value.

	Concrete	Pictorial	Abstract													
Introduce grid method	<p>Show the link with arrays to first introduce the grid method.</p> <p>Move on to using Base 10 to move towards a more compact method.</p> <p>Use place value counters to show place value groups of each number.</p>	<p>Using images of place value counters organised on a place value grid.</p> <p>$240 + 12 = 252$</p>	<p>Start by multiplying by a one-digit number and showing the addition clearly alongside the grid.</p> <table border="1"> <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														
Expanded column method	<p>25 x 3</p> <p>Recombine counters to count the total.</p>	<p>As above.</p> <p>Also refer back to arrays & number line images from Year 2.</p>	<p>Model expanded and compact methods alongside grid method.</p> <table style="display: inline-table; margin-right: 20px;"> <tr><td>h t o</td></tr> <tr><td> 3 5</td></tr> <tr><td>x 7</td></tr> <tr><td>—</td></tr> <tr><td> 3 5</td></tr> <tr><td>+ 2 1 0</td></tr> <tr><td>—</td></tr> <tr><td>2 4 5</td></tr> </table> <table style="display: inline-table;"> <tr><td>h t o</td></tr> <tr><td> 3 5</td></tr> <tr><td>x 7</td></tr> <tr><td>—</td></tr> <tr><td> 2 4 5</td></tr> </table>	h t o	3 5	x 7	—	3 5	+ 2 1 0	—	2 4 5	h t o	3 5	x 7	—	2 4 5
h t o																
3 5																
x 7																
—																
3 5																
+ 2 1 0																
—																
2 4 5																
h t o																
3 5																
x 7																
—																
2 4 5																

Children should

- Understand the commutative law & the relationship between multiplication & repeated addition.
- Begin to use counting and times table facts to solve problems mentally. (2x, 3x, 4x, 5x, 8x and 10x).
- Understand the effect of multiplying any whole number by 10 or 100 using place value.
- Have experience of applying these methods to a range of different contexts including worded multiplication problems & missing number problems.
- Have experience of solving positive integer scaling problems eg. If I know that $5 \times 3 = 15$, I also know that $50 \times 3 = 150$ and $5 \times 30 = 150$.



Multiply 2 and 3 digit numbers by a single digit.

Year 4

Continue to relate grid method to expanded column method as necessary.

Model compact column method alongside expanded.

Introduce 2 by 2 digit multiplication for the most able when children are ready.

Key Vocab:

Groups of, lots of, times, array, altogether, multiply, count, multiplied by, column, row, repeated addition, commutative, sets of, equal groups, as big as, once, twice, three times, partition, grid method, multiple, product, tens, ones, value. Inverse.

MULTIPLICATION

	Concrete	Pictorial	Abstract																
Reinforce understanding of grid method & expanded column method.	<p>Use place value counters to show place value groups of each number.</p>	<p>Fill each row with 126.</p> <p>Add up each column, starting with the ones making any exchanges needed.</p>	<table border="1"> <tr> <td>x</td> <td>200</td> <td>30</td> <td>5</td> </tr> <tr> <td>7</td> <td>1400</td> <td>210</td> <td>35</td> </tr> </table> <p>Th h t o 1400 + 210 + 35 = 1645</p> $\begin{array}{r} 235 \\ \times 7 \\ \hline 1645 \end{array}$	x	200	30	5	7	1400	210	35								
x	200	30	5																
7	1400	210	35																
Compact column method		As above.	<p>Model alongside expanded method.</p> <table border="1"> <tr> <td>Th h t o</td> <td>Th h t o</td> <td>Th h t o</td> </tr> <tr> <td>235</td> <td>235</td> <td>235</td> </tr> <tr> <td>x 7</td> <td>x 7</td> <td>x 7</td> </tr> <tr> <td>5</td> <td>45</td> <td>1645</td> </tr> <tr> <td>3</td> <td>2</td> <td>2</td> </tr> </table>	Th h t o	Th h t o	Th h t o	235	235	235	x 7	x 7	x 7	5	45	1645	3	2	2	
Th h t o	Th h t o	Th h t o																	
235	235	235																	
x 7	x 7	x 7																	
5	45	1645																	
3	2	2																	
Application of column methods to 2 by 2 digit numbers.	<p>Use place value counters to model as before. Emphasis importance of exchanging 10 counters for next place value.</p>	<p>Use pictorial images of place value counters.</p> <p>13 x 26 =</p> <p>Exchanges have taken place after multiplication.</p> <p>Initially use grid method to record this, before moving on to a column method.</p>	<p>Model expanded and compact method.</p> <p>13 x 26 =</p> <table border="0"> <tr> <td>h t o</td> <td>h t o</td> </tr> <tr> <td>13</td> <td>13</td> </tr> <tr> <td>x 26</td> <td>x 26</td> </tr> <tr> <td>18</td> <td>78</td> </tr> <tr> <td>60</td> <td>+ 260</td> </tr> <tr> <td>60</td> <td>338</td> </tr> <tr> <td>+ 200</td> <td></td> </tr> <tr> <td>338</td> <td></td> </tr> </table> <p>0 as a place holder</p>	h t o	h t o	13	13	x 26	x 26	18	78	60	+ 260	60	338	+ 200		338	
h t o	h t o																		
13	13																		
x 26	x 26																		
18	78																		
60	+ 260																		
60	338																		
+ 200																			
338																			

Children should

- Approximate before they calculate (make this a regular part of calculation) & refer back to their approximation as part of the checking process.
- Use place value multiplication to multiply by 10 and 100 and recognise that 30 x 50 can be found by multiplying 3 x 10 x 5 x 10 which is equal to 15 x 100. Understand that if I know the answer to 4 x 8, I can use this to find the answer to 40 x 8, 4 x 80 and 40 x 80, 400 x 8, 40 x 80.
- Understand the effect of multiplying by 0 and 1.
- Recall all times table facts.
- Apply written methods to a range of contexts including money & measures.

Years 5-6



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 6

I can mentally calculate using a mix of the four operations. Multiplying decimals up to 2 decimal places by a single digit.

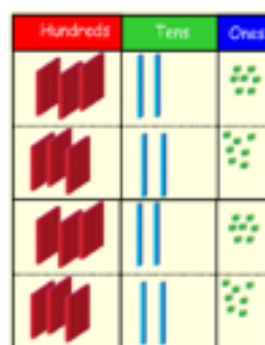
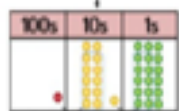
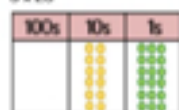
Key Vocab:

Groups of, lots of, times, array, altogether, multiply, count, multiplied by, column, row, repeated addition, commutative, sets of, equal groups, as big as, once, twice, three times, partition, grid method, multiple, product, tens, ones, value. **Inverse.**

MULTIPLICATION

Concrete

Formal column method with place value counters.
 6×23



It is important at this stage that they always multiply the ones first.

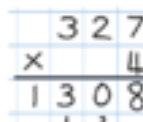
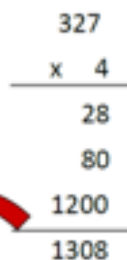
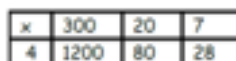
Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. $321 \times 2 = 642$

Pictorial

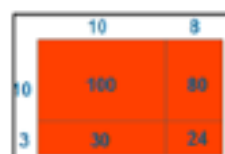
Draw bar model



?



This will lead to a compact method.

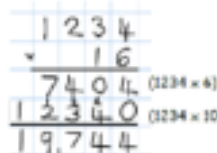


18×3 on the first row

$(8 \times 3 = 24, \text{ carrying the } 2 \text{ for } 20, \text{ then } 1 \times 3)$

18×10 on the 2nd row. Show

multiplying by 10 by putting zero in units first



(1234×4)

(1234×10)

Continue to use bar modelling to support problem solving

Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer.

