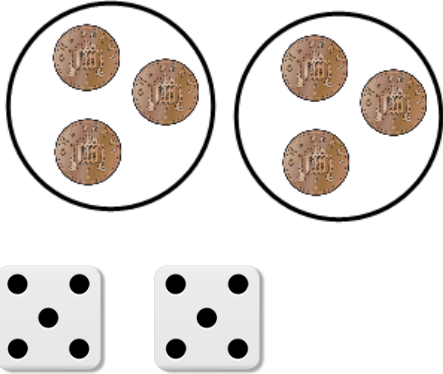

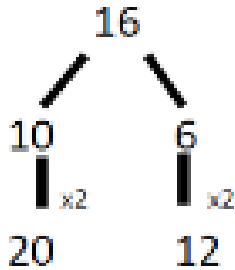


Thythorn Field Calculation Policy - Multiplication



Progression in Calculations

Doubling

CONCRETE	PICTORAL	ABSTRACT
<p>Washing line, and other practical resources for counting. Concrete objects. Numicon; bundles of straws, bead strings</p> 	<p>Draw pictures to show how to double a number</p> <p>Double 4 is 8</p> 	 <p>Partition a number and then double each part before recombining it back together.</p>

FS
Year 1
(Year 2)

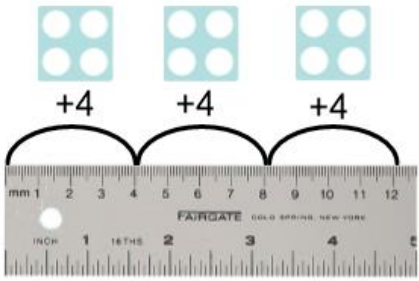


Repeated grouping/repeated addition

CONCRETE	PICTORAL	ABSTRACT
<p>3 x 4 or 3 lots of 4</p>  <p>Count in multiples supported by concrete objects in equal groups.</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 4 + 4 + 4</p>

Year 1
Year 2
Year 3

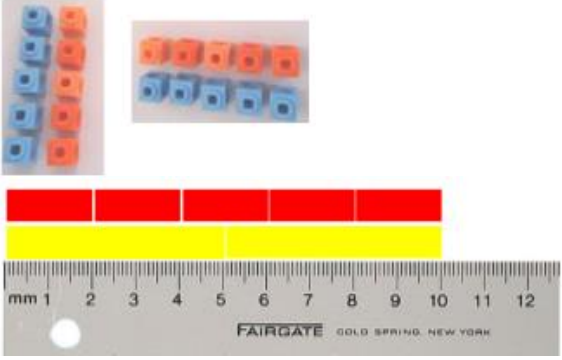
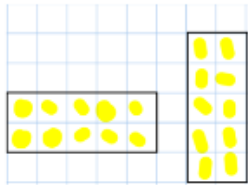
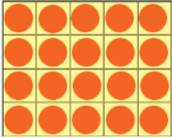

Thythorn Field Calculation Policy - Multiplication

Use number lines to show repeated groups

CONCRETE	PICTORAL	ABSTRACT
<p>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> 

Year 2
Year 3
Year 4

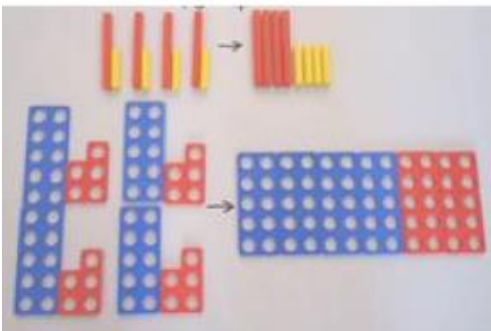
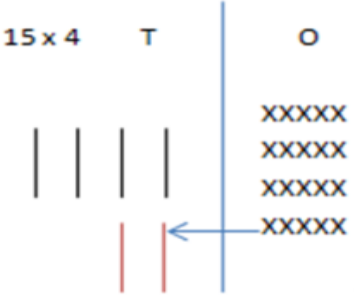
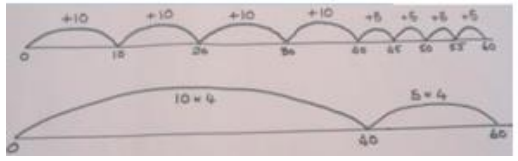
Use arrays to illustrate commutativity

CONCRETE	PICTORAL	ABSTRACT
<p>(counters and other objects can also be used) 2 x 5 = 5 x 2</p> 	<p>Children to draw the arrays in different rotations, to find commutative multiplication sentences.</p>  <p>Link arrays to area of rectangles.</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>

Year 2
Year 3
Year 4

Thythorn Field Calculation Policy - Multiplication

Partition to multiply

CONCRETE	PICTORAL	ABSTRACT
<p>(use numicon, base 10, Cuisenaire rods)</p> <p>4 x 15</p> 	<p>Children to represent the concrete manipulatives in a picture e.g. base 10 can be represented like:</p> <p>15 x 4 T O</p> 	<p>Children to be encouraged to show the steps they have taken:-</p> 4×15 $\begin{array}{r} 10 \quad 5 \\ 4 \times 15 \end{array}$ $10 \times 4 = 40$ $5 \times 4 = 20$ $40 + 20 = 60$ <p>A number line can also be used:-</p> 

Year 3
Year 4

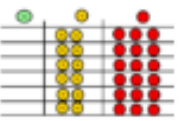
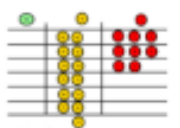
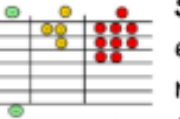


Grid Method

CONCRETE	PICTORAL	ABSTRACT																																																																																
<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> <div><table><tr><td>X</td><td>T</td><td>U</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table><p>4 rows of 13</p></div> <p>Move on to 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>Fill each row with 126.</p> <div><table><tr><td></td><td></td><td></td><td></td></tr><tr><td>100</td><td>10</td><td>10</td><td>10</td></tr><tr><td>100</td><td>10</td><td>10</td><td>10</td></tr><tr><td>100</td><td>10</td><td>10</td><td>10</td></tr><tr><td>100</td><td>10</td><td>10</td><td>10</td></tr></table><p>Calculations</p><p>4 x 126</p></div>	X	T	U																	100	10	10	10	100	10	10	10	100	10	10	10	100	10	10	10	<p>Children can represent the work they have done with place value counters or Base 10 in a way that they understand.</p> <p>They can draw the counters or Base 10, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.</p> <div><p>24 x 3 = 72</p><table><tr><td></td><td>20</td><td>4</td></tr><tr><td>3</td><td> </td><td>••••</td></tr><tr><td></td><td> </td><td>••••</td></tr><tr><td></td><td> </td><td>••••</td></tr><tr><td></td><td>60</td><td>12</td></tr></table><p>60 +12 72</p></div>		20	4	3		••••			••••			••••		60	12	<p>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.</p> <table><tr><td>X</td><td>7</td></tr><tr><td>30</td><td>210</td></tr><tr><td>5</td><td>35</td></tr></table> <p>Moving forward, multiply by a 2 digit number showing the different rows within the grid method.</p> <div><table><tr><td></td><td>10</td><td>8</td></tr><tr><td>10</td><td>100</td><td>80</td></tr><tr><td>3</td><td>30</td><td>24</td></tr></table></div> <div><table><tr><td>X</td><td>1000</td><td>300</td><td>40</td><td>2</td></tr><tr><td>10</td><td>10000</td><td>3000</td><td>400</td><td>20</td></tr><tr><td>8</td><td>8000</td><td>2400</td><td>320</td><td>16</td></tr></table></div>	X	7	30	210	5	35		10	8	10	100	80	3	30	24	X	1000	300	40	2	10	10000	3000	400	20	8	8000	2400	320	16
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Year 4
Year 5

Thythorn Field Calculation Policy - Multiplication

Column Multiplication

CONCRETE	PICTORAL	ABSTRACT
<p>With place value counters (children need this stage, initially, to understand how the column method works)</p> <p>6 x 23</p> <p>Step 1: get 6 lots of 23</p>  <p>Step 2: 6 x 3 is 18. Can I make an exchange? Yes! Ten ones for one ten....</p>  <p>Step 3: 6 x 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 in each column?</p> 	<p>Children to represent the counters/base 10, pictorially e.g. the image below.</p> 	<p>The aim is to get to the formal method but the children need to understand how it works.</p> <p>Start with long multiplication, reminding the children about lining up their numbers clearly in columns.</p> <p>If it helps, children can write out what they are solving next to their answer.</p> $ \begin{array}{r} 32 \\ \times 24 \\ \hline 8 \quad (4 \times 2) \\ 120 \quad (4 \times 30) \\ 40 \quad (20 \times 2) \\ 600 \quad (20 \times 30) \\ \hline 768 \end{array} $ <p>This moves to the more compact method.</p> $ \begin{array}{r} 6 \times 23 = \\ \begin{array}{r} 23 \\ \times 6 \\ \hline 138 \end{array} \end{array} $ $ \begin{array}{r} \begin{array}{cccc} & 2 & 3 & 1 \\ 1 & 3 & 4 & 2 \\ \times & 1 & 8 & \\ \hline 1 & 3 & 4 & 2 & 0 \\ 1 & 0 & 7 & 3 & 6 \\ \hline 2 & 4 & 1 & 5 & 6 \end{array} \end{array} $

Year 4
Year 5
Year 6

Thythorn Field Calculation Policy - Multiplication

Fluency variation, different ways to ask children to solve 6×23 :

23	23	23	23	23	23
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?

With the counters, prove that $6 \times 23 = 138$

Why is $6 \times 23 = 32 \times 6$?

Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week?

Tom saved 23p three days a week. How much did he save in 2 weeks?

Find the product of 6 and 23

$$6 \times 23 =$$

$$\begin{array}{r} \square = 6 \times 23 \\ 6 \quad 23 \\ \times \underline{23} \quad \times \underline{6} \\ \hline \hline \end{array}$$

What's the calculation? What's the answer?

