Calculation policy- MULTIPLICATION

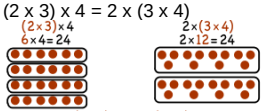
KS1	Pupils should memorise and reason with numbers in 2, 5 and 10 times tables. They should see ways to represent odd and even numbers and know how they are represented in tables. This will help them to understand the pattern in numbers. Pupils should begin to understand multiplication as scaling in terms of double and half (e.g. that tower of cubes is double the height of the other tower). Commutative law shown on array. Repeated addition can be shown mentally on a number line. Inverse relationship between multiplication and division. Use an array to explore how numbers can be organised into groups.	
Year	3	4
Layers of vocabulary  **Appendix 1a** Beck's Tiers of Vocabulary **Appendix 1b:** Vocabulary book	**Basic to subject specific (Beck's Tiers):** lots of, groups of ×, times, multiply, multiplication, multiplied by multiple of, product once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition array row, column double, halve share, share equally one each, two each, three each… **Instructional vocabulary:** carry on, continue repeat what comes next? predict describe the pattern, describe the rule find, find all, find different, investigate choose, decide, collect	**Basic to subject specific (Beck's Tiers):** lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition array row, column double, halve, factor, multiple **Instructional vocabulary:** carry on, continue, repeat what comes next? predict describe the pattern, describe the rule pattern, puzzle, calculate, calculation, mental calculation, method, jotting, answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation
NC 2014	Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including 2 digit numbers times 1 digit numbers progressing to formal written methods.	Multiply 2 digit and 3 digit numbers by a 1 digit number using formal written layout. Solve problems involving multiplying and adding.

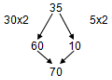
Calculation policy- MULTIPLICATION

<table>
<tr>
<td>Developing Conceptual/ Procedural Understanding</td>
<td>
Building tables

For example, build tables using counting stick- forwards and backwards and with missing jumps

Using known facts
If 3 x 2 = 6, then 30 x 2 = 60, 60 ÷3 = 20 and 30 = 60 ÷ 2.

Associativity
(2 x 3) x 4 = 2 x (3 x 4)


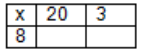
</td>
<td>
Partitioning strategy to double
Double 35


Place value materials to represent calculations
See Appendix 1

Partitioning
Informal recording of partitioned numbers
15 x 5 = 75

10 x 5 = 50
5 x 5 = 25

27 x 3 = 81

20x3 = 60
7x3 = 21
“20 multiplied by 3 equals 60 and 7 multiplied by 3 equals 21. 60 add 21 equals 81.”
</td>
<td>
Grid method
23 x 8 =
20 x 8 =160
3 x 8 = 24
23 x 8= 184

Short multiplication
Expanded

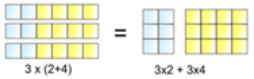
23
x 8
24 (8 x3)
160 (8 x20)
184

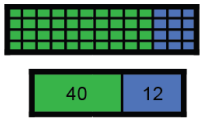
leading to compact
23
x 8
184
2

Representing problems
A group of aliens live on Planet Xert. Tinions have three legs, Quinions have four legs. The group has 22 legs altogether. How many Tinions and Quinions might there be? Is there more than one solution?
</td>
<td>
Building tables

For example, build tables using counting stick- forwards and backwards and with missing jumps

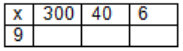
Using known facts
If 2 x 3 = 6 then 200 x 3 = 600 and 600 ÷3 = 200

Distributivity
3 x (2 +4) = 3 x 2 + 3 x 4
So the ‘3’ can be ‘distributed’ across the ‘2 + 4’ into 3 times 2 and 3 times 4


leading to
13 x 4 = 10 x 4 + 3 x 4 = 52


</td>
<td>
Place value materials to represent calculations

Grid method
(if needed for conceptual understanding)

346 x 9

Short multiplication
Expanded

346
x 9
54 (9 x 6)
360 (9 x 40)
2700 (9 x 300)
3114

leading to compact
4 5
346
x 9
3114

<u>Demonstrate carrying to the top in preparation for long multiplication</u>
</td>
<td>
Representing problems

Multiply a number by itself and then make one factor one more and the other one less. What do you notice? Does this always happen?

Eg 4 x 4 = 16 6 x 6= 36
5 x 3 = 15 7 x 5= 35
Try out more examples to prove your thinking.

Place <, >, or = in these number sentences to make them correct:
50 x 4 ▭ 4 x 50
4 x 50 ▭ 40 x 5
200 x 5 ▭ 3 x 300
</td>
</tr>
<tr>
<td>Known facts</td>
<td colspan="2">Recall and use x and ÷ facts for the 3, 4 and 8 x tables</td>
<td colspan="3">Recall x and ÷ facts for x tables up to 12 x 12.</td>
</tr>
<tr>
<td rowspan="3">Essential knowledge</td>
<td>Review 2x, 5x and 10x</td>
<td>Double 2 digit numbers</td>
<td>4x and 8x tables</td>
<td>10x bigger</td>
</tr>
<tr>
<td>4x table</td>
<td>3x table</td>
<td>3x, 6x and 12x tables</td>
<td>Double larger numbers and decimals</td>
</tr>
<tr>
<td>8 x table</td>
<td>6x table</td>
<td>3x and 9x tables</td>
<td>11x and 7x tables</td>
</tr>
</table>

Year	5	6

Calculation policy- MULTIPLICATION

<table>
<tr>
<td>Layers of vocabulary

Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</td>
<td colspan="3">Basic to subject specific (Beck's Tiers):
lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition array row, column double, halve share, share equally
factor, multiple, prime, composite

Instructional vocabulary:
carry on, continue, repeat what comes next? predict describe the pattern, describe the rule
find, find all, find different investigate</td>
<td colspan="2">Basic to subject specific (Beck's Tiers):
lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition array row, column double, halve share, share equally
factor, multiple, prime, composite

Instructional vocabulary:
carry on, continue, repeat what comes next? predict describe the pattern, describe the rule
find, find all, find different investigate</td>
</tr>
<tr>
<td>NC 2014</td>
<td colspan="3">Multiply numbers up to 4 digits by a 1 or 2 digit number using a formal written method, including long multiplication for 2 digit numbers
Solve problems involving multiplication and division including using knowledge of factors and multiples, squares and cubes
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</td>
<td colspan="2">Multiply multi-digit numbers up to 4 digits by a 2 digit whole number using the formal written method of long multiplication.
Solve problems involving addition, subtraction, multiplication and division.</td>
</tr>
<tr>
<td>Developing Conceptual/ Procedural Understanding</td>
<td>Building tables

For example, apply tables knowledge to multiples of 10, 100 and 1000 using counting stick- forwards and backwards and with missing jumps

Using known facts
If 2 x 3 = 6 then 2000 x 3 = 6000 and
200 x 30 = 6000

Place value materials to represent calculations

Short multiplication
Use expanded method first if needed to build conceptual understanding
4346</td>
<td>Grid method
(if needed for conceptual understanding)
28 x 27

Addition to be done mentally or across followed by column addition

Long multiplication
Expanded
28
x 27
56 (7x8)
140 (7 x20)
160 (20x8)
400 (20x20)
756</td>
<td>leading to compact
1 5
28
x 27
196
560
756

Extend to HTU x TU or ThHTU x TU as appropriate

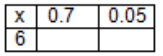
Representing problems
40 cupcakes cost £3.60, how much do 20 cupcakes cost? How much do 80 cupcakes cost? How much do 10 cupcakes cost?</td>
<td>Building tables

For example, apply tables knowledge to decimals using counting stick- forwards and backwards and with missing jumps

Using known facts
If 2 x 3 = 6 then 0.2 x 3 =0.6 and 0.02 x 3 = 0.06

Long multiplication
Use expanded method first if needed to build conceptual understanding
5172
x 27
36204
103440
139644 carried digits to the top</td>
<td>If place value is secure, use grid method for decimal multiplication
0.75 x 6

0.7 x 6 = 4.2
0.05 x 6 = 0.3
0.75 x 6 = 4.5

Make explicit links between decimals and money


Representing problems
Amy is given the calculation 5413 x 600. She says "I can do this without a written method." Write down the mental steps you think Amy could do.</td>
</tr>
</table>

Calculation policy- MULTIPLICATION

<table>
<tr><td></td><td colspan="2">x 8
34768
234</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Known facts</td><td colspan="3">Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
Recall prime numbers up to 19
Recognise and use square and cube numbers and the notation for squared (^{2}) and cubed (^{3})</td><td colspan="3">Identify common factors, common multiples and prime numbers</td></tr>
<tr><td rowspan="3">Essential knowledge</td><td colspan="2">4x and 8x tables</td><td>100, 1000 times bigger</td><td colspan="2">Multiplication facts up to 12 x 12</td><td>Partition to multiply mentally</td></tr>
<tr><td colspan="2">3x, 6x and 12x tables; 3x and 9x tables</td><td>10, 100, 1000 times smaller</td><td colspan="2" rowspan="2">Apply place value to derive multiplication facts, e.g. 3 x 4 = 12 so 3 x 0.4 = 1.2</td><td>Double larger numbers and decimals</td></tr>
<tr><td colspan="2">11x and 7x tables</td><td>Double larger numbers and decimals</td><td></td></tr>
</table>