Multiplication

Year 3	Year 4
 **Basic to subject specific (Beck's Tiers):** equal groups of, lots of, groups of, times, multiply, multiplication, multiplied by multiple facts, of, times, columns, rows, factors, products, repeated addition, partition, inverse 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 multiple, multiplication array, multiplication tables / **Instructional vocabulary:** carry on, continue, repeat what comes next? predict describe the pattern, describe the rule, find, find all, find different investigate **Generalisation** Commutative law shown on array (video) • Inverse relationship between multiplication and division. Use an array to explore how numbers can be organised into groups • Generalisations • Connecting x2, x4 and x8 through multiplication facts • Comparing times tables with the same times tables which is ten times bigger. If 4 x 3 = 12, then we know 4 x 30 = 120. Use place value counters to demonstrate this. • When they know multiplication facts up to x12, do they know what x13 is? (i.e. can they use 4x12 to work out 4x13 and 4x14 and beyond?) **Some Key Questions** What do you notice? What's the same? What's different? Can you convince me? How do you know?	 **Basic to subject specific (Beck's Tiers):** equal groups of, multiple, lots of, groups of times, multiply, multiplication array, multiplication tables / facts 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, products, partition, inverse **Instructional vocabulary:** carry on, continue, repeat what comes next? predict describe the pattern, describe the rule find, find all, find different investigate **Generalisation** • Commutative law shown on array (video) • Inverse relationship between multiplication and division. Use an array to explore how numbers can be organised into groups • Children given the opportunity to investigate numbers multiplied by 1 and 0. • When they know multiplication facts up to x12, do they know what x13 is? (i.e. can they use 4x12 to work out 4x13 and 4x14 and beyond?) **<u>Some Key Questions</u>** What do you notice? What's the same? What's different? Can you convince me? How do you know?
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.	**NC 2014:** Multiply 2 digit and 3 digit numbers by a 1 digit number using formal written layout. Solve problems involving multiplying and adding.

Mental Strategies

Children should continue to count regularly, on and back, now including multiples of 4, 8, 50, and 100, and steps of tenths.

The number line should continue to be used as an important image to support thinking, and the use of informal jottings and drawings to solve problems should be encouraged.

Demonstrating multiplication on a number line – jumping in larger groups of amounts

13 x 4 = 10 groups 4 = 3 groups of 4

Children should practise times table facts using teaching strategies such as: singing tables, table ITP, promote patterns including doubling for 2's, 4's and 8'sidentifying table facts for instant recall.

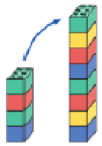
MULTIPLICATION BOARD ITP

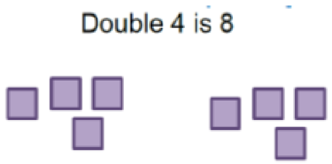
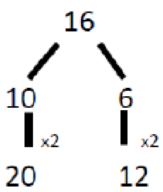
MULTIPLICATION TABLES ITP

Doubles are same as x2.

Vocabulary of double, multiply, groups of, sets of, lots of etc.

Concrete, pictorial abstract.

Doubling	Use practical activities to show how to double a number.  double 4 is 8 4 x 2 = 8

Draw pictures to show how to double a number. 	Partition a number and then double each part before recombining it back together. 

Draw pictures to show how to double a number

Partitioning strategy for doubling.

Double 35

Mental Strategies

Children should continue to count regularly, on and back, now including multiples of 6, 7, 9, 25 and 1000, and steps of hundreths.

Become fluent and confident to recall all tables to x 12

Use the context of a week and a calendar to support the 7 times table (e.g. how many days in 5 weeks?)

Multiply 3 numbers together

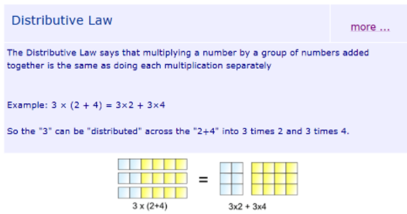
The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged.

They should be encouraged to choose from a range of strategies:

- Partitioning using x10, x20 etc
- Doubling to solve x2, x4, x8
- Recall of times tables
- Use of commutativity of multiplication.

Approximate first.

Partitioning / distributive law, e.g. 28x4 can be split up into 25x4 add 3x4 or 30x4 subtract 2x4.



Pupils to explain the effect of multiplying by 10 and 100.

Addition to be done mentally.

HTU and TU x U.

Record using expanded notation of the grid and expanded short multiplication.

346 x 9

35

30x2 5x2

60 10

70

A lolly costs 21p. How much do 3 cost?

21

20x3 1x3

60 3

63

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.”

x	300	40	6
9			

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  346
x   9
   54 (9 x 6)
  360 (9 x 40)
 2700 (9 x 300)
 3114
 11
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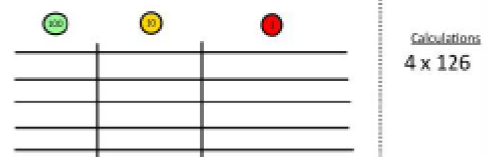
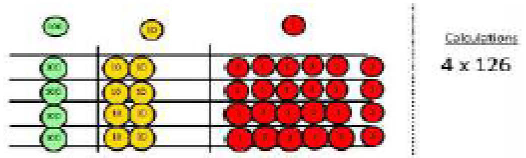
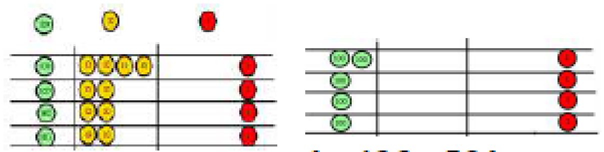
Use place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.



Fill each row with 126.



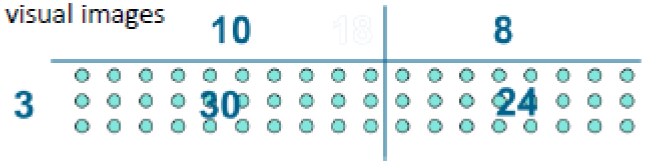
Add up each column, starting with the ones making any exchanges needed.



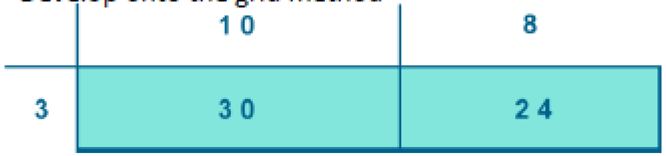
4 × 126 = 504

Written methods (progressing to 2d x 1d)

Developing written methods using understanding of visual images



Develop onto the grid method



18 x 3 =
10 x 3 =30
8 x 3 = 24

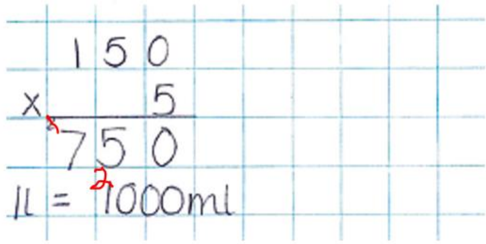
Start with multiplying by one digit numbers and showing **the clear addition** alongside the grid.

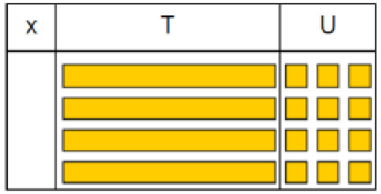
Children can represent the work they have done with arrays in a way that they understand.

Give children opportunities to explore this and deepen understanding using Dienes apparatus and place value counters – this equipment is differentiation of conceptual understanding. See below – children need to be exposed to a variety. The place value counters are more abstract. They can be asked, 'what's the same? What's different?

Short multiplication with compact notation to be introduced once the expanded method is secure.

A bottle holds 1 litre of lemonade.
Rachel fills 5 glasses with lemonade.
She puts 150 millilitres in each glass.
How much lemonade is left in the bottle?



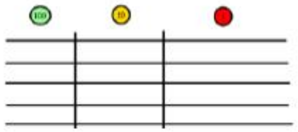


4 rows of 13

Children can represent the work they have done with place value counters in a way that they understand.

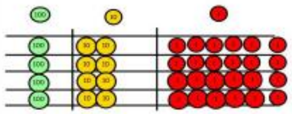
They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.

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.



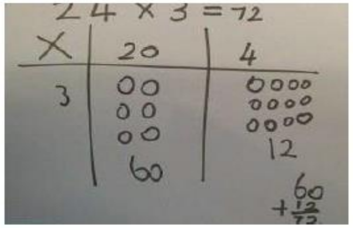
Calculations
4 x 126

Fill each row with 126.



Calculations
4 x 126

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



Progressing to formal written methods. Practical equipment and images need to be used alongside this methods to ensure conceptual understanding.

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

Known facts	Recall and use x and ÷ facts for the 3, 4 and 8 x tables		Recall x and ÷ facts for x tables up to 12 x 12.	
Essential knowledge	Review 2x, 5x and 10x	Double 2 digit numbers	4x and 8x tables	10x bigger
	4x table	3x table	3x, 6x and 12x tables	Double larger numbers and decimals
	8 x table	6x table	3x and 9x tables	11x and 7x tables