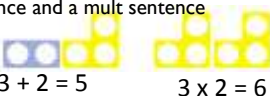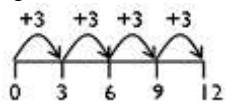| Year group and Notes	Written Calculations	Models & Images	Mental Calculations for Fluecy	Known Facts for fluency	Problem Solving
Foundation Stage **Development** **Matters/ELGs**	Informal jottings, mathematical mark making,, problem solving process, use of blank paper	Repeated groups of the same size	Count repeated groups of the same size Respond to/make up number stories	Have some knowledge of terminology such as 'lots of'.	
Year 1 solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher		Practise counting in 2s, 5s and 10s, including using visual images for support **Numicon** Practise showing the difference between an addition sentence and a mult sentence 3 + 2 = 5 3 x 2 = 6 - Start to use arrays (See Y2)		<u>Instant recall</u> • Doubles of numbers to 10	<u>Lot's of biscuits</u> http://nrich.maths.org/6883 <u>Share bears</u> http://nrich.maths.org/2358
Year 2 Count in steps of 2,3,5, 10 forward and backward from any number Use repeated addition to solve multiplication problems solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts Vocabulary: lots of, groups of times, multiply, repeated addition, array	Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the symbols **Repeated addition on a number line** e.g. 3 x 4 = 12	**Arrays** These show commutative properties ie 1 array shows 3x4=4x3 **Counting stick times tables** NB Its worth watching 17x table on youtube	-Show that multiplication of 2 numbers can be done in any order (commutative) and division cannot Use counting up in 3s, 5s and 10s (using fingers and other tools to keep track of groups) to start to derive multiplication facts, phrased as 'what is 4 times 3' or ;how many in four groups of 3'	<u>Instant recall</u> • Doubles of numbers to 20 • times table facts for 2x 5x and 10x • Recognise odd and even numbers	<u>Odd times even</u> http://nrich.maths.org/8062 <u>Two numbers under the microscope</u> http://nrich.maths.org/8059 <u>Even and odd</u> http://nrich.maths.org/6895 <u>Ring a ring of numbers</u> http://nrich.maths.org/2782 <u>More numbers in a ring</u> http://nrich.maths.org/2783 <u>How odd</u> http://nrich.maths.org/7190 <u>Doing and undoing</u> http://nrich.maths.org/8292 <u>Clapping times</u> http://nrich.maths.org/5482 <u>The amazing splitting plant</u> http://nrich.maths.org/159 <u>Ip Dip</u> http://nrich.maths.org/7185 <u>Are you well balanced?</u> http://nrich.maths.org/4734 <u>Magic Plant</u> http://nrich.maths.org/145 <u>The tomato and the bean</u> http://nrich.maths.org/1079

Year 3	Grid method	'Rows of chairs in hall' (array) as visual representation of grid method		Instant recall	Ordering cards

Year 3

Write and calculate mathematical statements for x and ÷ using the x facts they know, including for 2digit numbers x 1digit numbers, using mental and progressing to formal written calculations.

Estimate the answer to a calculation and use the inverse operations to check the answers.

Chn need to get VERY confident with all 2x, 3x, 4x, 5x, 10x should be instant recall; Can use double of 3x and 4x for 6x and 8x Can use finger method initially for 9x;

solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects
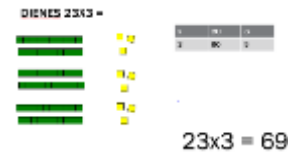
Vocabulary: lots of, groups of times, multiply, repeated addition, array, factor, multiple
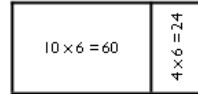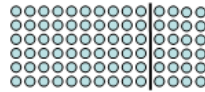
Grid method
Multiply a 2 digit number by 2, 3, 4 5 & 6 – use PV counters to model

X	30	2
4	120	8
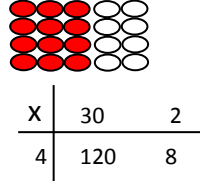
Extend grid method to 2 digit by 2 digit - dotty paper useful to model this.

DIENES 23X3 =

$23 \times 3 = 69$

'Rows of chairs in hall' (array) as visual representation of grid method

$10 \times 6 = 60$ $4 \times 6 = 24$

- Count from 0 in mutiples of 4,8,5 and 50
- Multiply a number by doubling and doubling again
- Multiply a 2 digit whole number by 10

<u>Instant recall</u>
- Double 15, 25, 35, 45
- Mental recall of 2, 3, 4, 5, 8 and 10
- Begin to know times table facts for 6x, 7x, 8x and 9x

<u>Derived</u>
- Times table facts for 6x, 7x, 8x and 9x
- Times tables & place value calculations such as 70 x 3

<u>Ordering cards</u>
http://nrich.maths.org/8058
<u>Music to my ears</u>
http://nrich.maths.org/5483
<u>A square of numbers</u>
http://nrich.maths.org/2005
<u>What do you need?</u>
http://nrich.maths.org/5950
<u>The Pied Piper of Hamelin</u>
http://nrich.maths.org/8315
<u>Follow the Numbers</u>
http://nrich.maths.org/7127
<u>What's in the box</u>
http://nrich.maths.org/5576
<u>How do you do it?</u>
http://nrich.maths.org/6901

Year 4
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying 3 numbers together
- Estimate the answer to a calculation and use the inverse operations to check the answers
- Recognise and describe number relationships, incl multiple, factors and squares, prime

solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer

Multiply 2 digit and 3 digit numbers by a one digit number using formal written layout
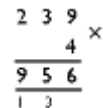
Short multiplication for single digit multiplication
- Use efficient methods of short multiplication (see video)
- Multiply a simple decimal by a single digit, e.g. 36.2 x 8

$$\begin{array}{r} 2\ 3\ 9 \\ \times\quad 4 \\ \hline 9\ 5\ 6 \\ {\scriptstyle 1\quad 3} \end{array}$$

Grid method
Use grid method to use with 2 digit by 2 digit and extend to a single digit x decimal as well

Introduce short multiplication linked to grid for 2/3 digit by 1 digit

Grid method
Extend grid method to use with a single digit x decimal

x	6
2.0	12.0
0.3	1.8

13.8

- Count in multiples of 6,7,9,25 and 1000
- recognise and use factor pairs commutatively and in mental calculations
- Use place value to multiply a whole number by 10 or 100
- Multiply two multiples of 10 together, e.g. 40 x 30

Partitioning
Multiply teens numbers by single digit by visualised partitioning

$14 \times 6 = 84$
$60 + 24$

<u>Instant recall</u>
- Recall multiplication facts up to 12 x 12
- Quickly derive corresponding division facts

<u>Derived</u>
- Times tables & PV calculations with decimals such as 0.7 x 3

<u>Multiplication square jigsaw</u>
http://nrich.maths.org/5573
<u>Shape times shape</u>
http://nrich.maths.org/5714
<u>Table patterns go wild</u>
http://nrich.maths.org/6924
<u>That number square</u>
http://nrich.maths.org/8169
<u>Carrying cards</u>
http://nrich.maths.org/2726
<u>Light the lights again</u>
http://nrich.maths.org/7035
<u>Multiples grid</u>
http://nrich.maths.org/5429
<u>Zios and Zepts</u>
http://nrich.maths.org/1005
<u>Trebling</u>

scaling problems and harder correspondence problems such as n objects are connected to m objects					http://nrich.maths.org/2004 All the digits http://nrich.maths.org/1129
Year 5 Identify multiples and factors, including finding all factor pairs and common factors of 2 numbers - know and use the vocabulary of prime numbers, prime factors and composite numbers -Establish whether a number up to 100 is prime -Recognise and use square numbers and cube numbers (and notation) solve problems involving multiplication and division including using their 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	Multiply numbers up to 4 digits by a one or 2digit number using a formal written method, including long multiplication of 2-digit numbers **Short multiplication** Multiply decimal numbers by a single digit, e.g. 31.62 x 8 Multiply any 3 digit number by any 2 digit number using a compact written calculation. **Long multiplication by formal method**		- Multiply decimals and whole number by 10, 100 and 1000 - Multiply a two digit number by a single digit - Count forwards or backwards in steps of powers of 10 for any given number up to 1000000 - Multiply and divide decimals and whole numbers by 10, 100 and 1000 - Multiply a two digit number by a single digit, drawing on known facts	Instant recall • Times tables & place value calculations such as 40 x 3 Derived • Times tables & PV calculations with decimals such as 0.7 x 0.3	Sweets in a box http://nrich.maths.org/84 Which is quicker? http://nrich.maths.org/1817 Multiplication squares http://nrich.maths.org/1134 Flashing lights http://nrich.maths.org/1014
Year 6 Use their knowledge of the order of operations to carry out calculations involving four operations . -Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy -identify common factors, common multiples and prime numbers	Multiply multi-digit numbers up to 4 digits by a 2digit number using the formal written method of long multiplication.		- Perform mental calculations, including with mixed operation and large numbers - Associate a fraction with division and calculate decimal fraction equivalents		Exploring number patterns you make http://nrich.maths.org/8387 Mystery matrix http://nrich.maths.org/1070 Factor-multiple chains http://nrich.maths.org/5578 The moons of Vuvv http://nrich.maths.org/1066 Round and Round the Circle http://nrich.maths.org/86 Counting cogs http://nrich.maths.org/6966 Four go http://nrich.maths.org/5633

-use common factors to simplify fractions; use common multiples to express fractions in the same denomination. -calculate , estimate and compare volume of cubes and cuboids using standard units.				