CALCULATION POLICY – MULTIPLICATION

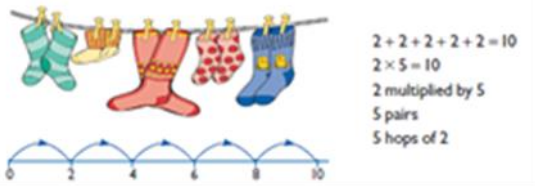
Years 1~3

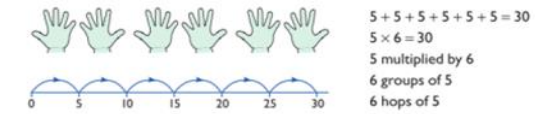
Honesty Encourage Respect Inspire Create

Year 1

Understand multiplication is related to doubling and combing groups of the same size (repeated addition)

Washing line, and other practical resources for counting. Concrete objects. Numicon; bundles of straws, bead strings



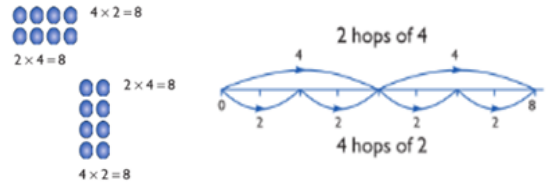


Problem solving with concrete objects (including money and measures

Use cuissenaire and bar method to develop the vocabulary relating to 'times' –

Pick up five, 4 times

Use arrays to understand multiplication can be done in any order (commutative)



Year 2

Expressing multiplication as a number sentence using x

Using understanding of the inverse and practical resources to solve missing number problems.

7 x 2 = □ □ = 2 x 7

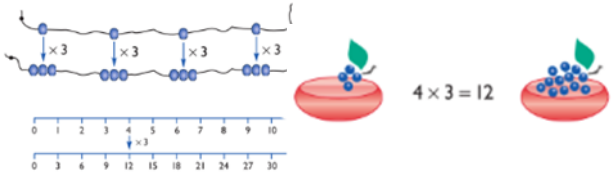
7 x □ = 14 14 = □ x 7

□ x 2 = 14 14 = 2 x □

□⊗ = 14 14 = □⊗

Develop understanding of multiplication using array and number lines (see Year 1). Include multiplications not in the 2, 5 or 10 times tables.

Begin to develop understanding of multiplication as scaling (3 times bigger/taller)



Doubling numbers up to 10 + 10

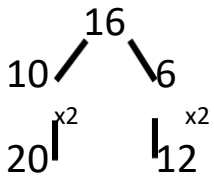
Link with understanding scaling

Using known doubles to work out double 2d numbers

(double 15 = double 10 + double 5)

Towards written methods

Use jottings to develop an understanding of doubling two digit numbers.



Year 3

Missing number problems

Continue with a range of equations as in Year 2 but with appropriate numbers.

Mental methods

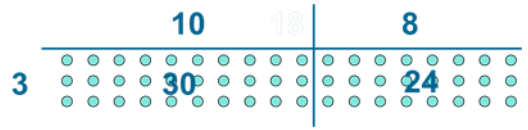
Doubling 2 digit numbers using partitioning

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

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

Written methods (progressing to 2d x 1d)

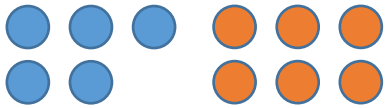
Developing written methods using understanding of visual images



Develop onto the grid method

Give children opportunities for children to explore this and deepen understanding using Dienes apparatus and place value counters

EXTRA GUIDANCE – PROGRESSION IN REASONING -MULTIPLICATION

Year 1	Year 2	Year 3
Mental Strategies Children should experience regular counting on and back from different numbers in 1s and in multiples of 2, 5 and 10. Children should memorise and reason with numbers in 2, 5 and 10 times tables They should see ways to represent odd and even numbers. This will help them to understand the pattern in numbers.  Children 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) **Vocabulary** Ones, groups, lots of, doubling repeated addition groups of, lots of, times, columns, rows longer, bigger, higher etc times as (big, long, wide …etc) **Generalisations** Understand 6 counters can be arranged as 3+3 or 2+2+2 Understand that when counting in twos, the numbers are always even. **Some Key Questions** Why is an even number an even number? What do you notice? What's the same? What's different? Can you convince me? How do you know?	**Mental Strategies** Children should count regularly, on and back, in steps of 2, 3, 5 and 10. Number lines should continue to be an important image to support thinking, for example Children should explore times table facts in a variety of ways and use these to practice facts e.g. 2 x 1 = 2 x 2 = 2 x 3 = Use a clock face to support understanding of counting in 5s. Use money to support counting in 2s, 5s, 10s, 20s, 50s **Vocabulary** multiple, multiplication array, multiplication tables / facts groups of, lots of, times, columns, rows **Generalisation** Commutative law shown on array (video) 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. **Some Key Questions** What do you notice? What's the same? What's different? Can you convince me? How do you know?	**Mental Strategies** Children should continue to count regularly, on and back, now including multiples of 4, 8, 50, and 100, and steps of 1/10. 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. Children should explore times table facts in a variety of ways and use these to practice facts e.g. 3 x 1 = 3 x 2 = 3 x 3 = **Vocabulary** partition grid method inverse **Generalisations** Connecting x2, x4 and x8 through multiplication facts Comparing times tables with the same times tables which is ten times bigger (scaling). 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?

CALCULATION POLICY – MULTIPLICATION

Years 4~6

Honesty Encourage Inspire Respect Create

Year 4

Continue with a range of equations as in Year 2 but with appropriate numbers. Also include equations with missing digits

□2 x 5 = 160

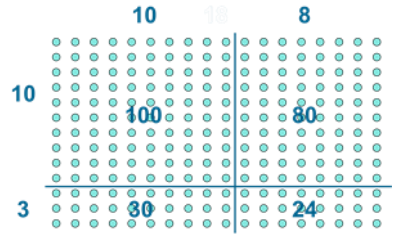
Mental methods

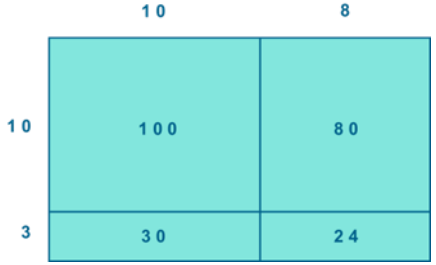
Counting in multiples of 6, 7, 9, 25 and 1000, and steps of 1/100.

Solving practical problems where children need to scale up. Relate to known number facts. (e.g. how tall would a 25cm sunflower be if it grew 6 times taller?)

Written methods (progressing to 3d x 2d)

Children to embed and deepen their understanding of the grid method to multiply up 2d x 2d. Ensure this is still linked back to their understanding of arrays and place value counters.





Year 5

Continue with a range of equations as in Year 2 but with appropriate numbers. Also include equations with missing digits

Mental methods

X by 10, 100, 1000 using moving digits ITP

Use practical resources and jottings to explore equivalent statements (e.g. 4 x 35 = 2 x 2 x 35)

Recall of prime numbers up 19 and identify prime numbers up to 100 (with reasoning)

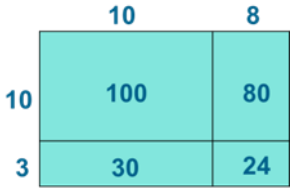
Solving practical problems where children need to scale up. Relate to known number facts.

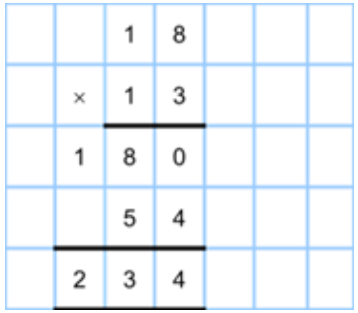
Identify factor pairs for numbers

Written methods (progressing to 4d x 2d)

Long multiplication using place value counters

Children to explore how the grid method supports an understanding of long multiplication (for 2d x 2d)





Year 6

Continue with a range of equations as in Year 2 but with appropriate numbers. Also include equations with missing digits

Mental methods

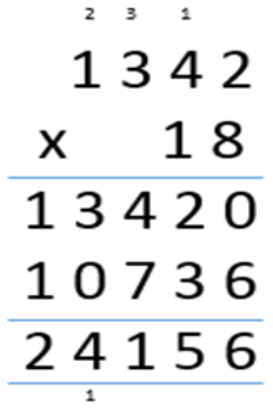
Identifying common factors and multiples of given numbers

Solving practical problems where children need to scale up. Relate to known number facts.

Written methods

Continue to refine and deepen understanding of written methods including fluency for using long multiplication

X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16



EXTRA GUIDANCE – PROGRESSION IN REASONING -MULTIPLICATION

Year 4	Year 5	Year 6
Mental Strategies Children should continue to count regularly, on and back, now including multiples of 6, 7, 9, 25 and 1000, and steps of 1/100. 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?) Use of finger strategy for 9 times table. 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 **Vocabulary** Factor **Generalisations** 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?) **Some Key Questions** What do you notice? What's the same? What's different? Can you convince me? How do you know?	**Mental Strategies** Children should continue to count regularly, on and back, now including steps of powers of 10. Multiply by 10, 100, 1000, including decimals (Moving Digits ITP) 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 to solve problems mentally: Partitioning using x10, x20 etc Doubling to solve x2, x4, x8 Recall of times tables Use of commutativity of multiplication If children know the times table facts to 12 x 12. Can they use this to recite other times tables (e.g. the 13 times tables or the 24 times table) **Vocabulary** cube numbers prime numbers square numbers common factors , prime factors composite numbers **Generalisation** Relating arrays to an understanding of square numbers and making cubes to show cube numbers. Understanding that the use of scaling by multiples of 10 can be used to convert between units of measure (e.g. metres to kilometres means to times by 1000) **Some Key Questions** What do you notice? What's the same? What's different? Can you convince me? How do you know? How do you know this is a prime number?	**Mental Strategies** Consolidate previous years. Children should experiment with order of operations, investigating the effect of positioning the brackets in different places, e.g. 20 – 5 x 3 = 5; (20 – 5) x 3 = 45 They should be encouraged to choose from a range of strategies to solve problems mentally: Partitioning using x10, x20 etc Doubling to solve x2, x4, x8 Recall of times tables Use of commutativity of multiplication If children know the times table facts to 12 x 12. Can they use this to recite other times tables (e.g. the 13 times tables or the 24 times table) **Vocabulary** See previous years common factor **Generalisations** Order of operations: brackets first, then multiplication and division (left to right) before addition and subtraction (left to right). Children could learn an acrostic such as PEMDAS, or could be encouraged to design their own ways of remembering. Understanding the use of multiplication to support conversions between units of measurement. **Some Key Questions** What do you notice? What's the same? What's different? Can you convince me? How do you know?