

Calculation Policy

Multiplication and Division

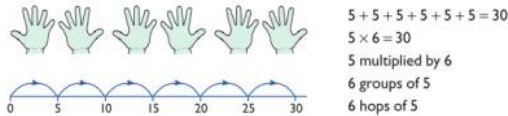
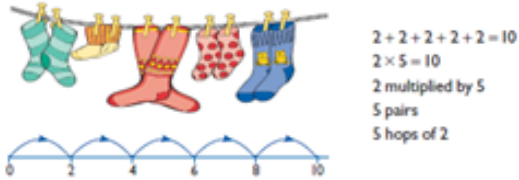
Years 1-6



Multiplication Year 1

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

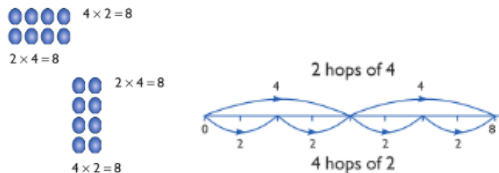
Washing line, and other practical resources for counting. Concrete objects. Numicon; bundles of straws, bead strings



Problem solving with concrete objects (including money and measures)

Use cuisenaire 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)



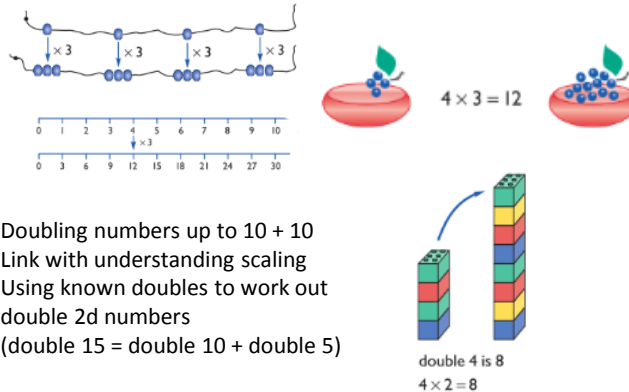
Multiplication Year 2

Expressing multiplication as a number sentence using x
Using understanding of the inverse and practical resources to solve missing number problems.

$7 \times 2 = \square$ $\square = 2 \times 7$
 $7 \times \square = 14$ $14 = \square \times 7$
 $\square \times 2 = 14$ $14 = 2 \times \square$
 $\square \times \bigcirc = 14$ $14 = \square \times \bigcirc$

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

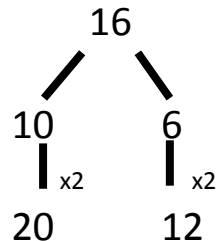
Begin to develop understanding of multiplication as scaling (3 times bigger/taller)



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.



Multiplication Year 3

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

Mental methods

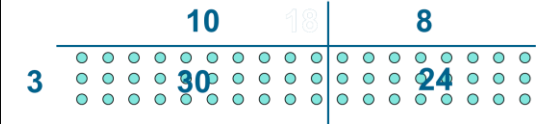
Doubling 2 digit numbers using partitioning

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

$13 \times 4 = 10 \text{ groups } 4 + 3 \text{ groups of } 4$

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

Children will then progress to formal methods of short multiplication.

Multiplication Year 4

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

$$\square 2 \times 5 = 160$$

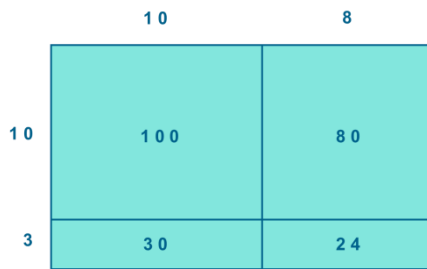
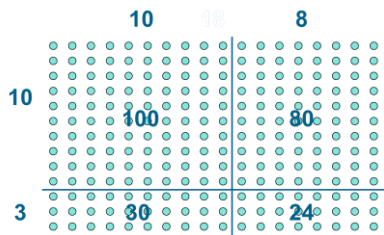
Mental methods

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.



Children continue to embed and deepen their understanding of the short formal written method of multiplication.

Multiplication 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. $4 \times 35 = 2 \times 2 \times 35$)

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.

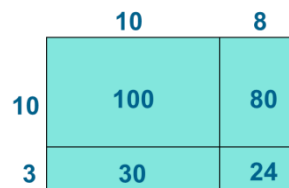
Identify factor pairs for numbers

Written methods (progressing to 4d x 2d)

Children should be able to use formal short multiplication method to multiply large digits by a one digit number.

Long multiplication using place value counters

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



		1	8		
	x	1	3		
		1	8	0	
		5	4		
		2	3	4	

Multiplication 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 short multiplication and developing fluency for using long multiplication

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

$$\begin{array}{r}
 2 3 1 \\
 1342 \\
 \times 18 \\
 \hline
 10736 \\
 24156 \\
 \hline
 1
 \end{array}$$

Division Year 1

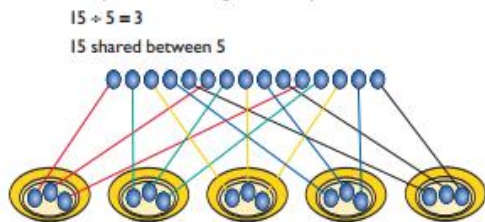
Children must have secure counting skills- being able to confidently count in 2s, 5s and 10s.

Children should be given opportunities to reason about what they notice in number patterns.

Group AND share small quantities- understanding the difference between the two concepts.

Sharing

Develops importance of one-to-one correspondence.



Children should be taught to share using concrete apparatus.

Grouping

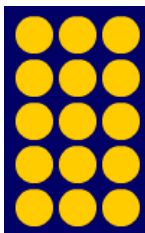
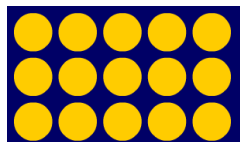
Children should apply their counting skills to develop some understanding of grouping.



Use of arrays as a pictorial representation for division.

$15 \div 3 = 5$ There are 5 groups of 3.

$15 \div 5 = 3$ There are 3 groups of 5.



Children should be able to find $\frac{1}{2}$ and $\frac{1}{4}$ and simple fractions of objects, numbers and quantities.

Division Year 2

\div = signs and missing numbers

$6 \div 2 = \square$ $\square = 6 \div 2$

$6 \div \square = 3$ $3 = 6 \div \square$

$\square \div 2 = 3$ $3 = \square \div 2$

$\square \div \nabla = 3$ $3 = \square \div \nabla$

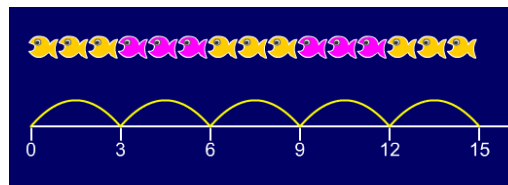
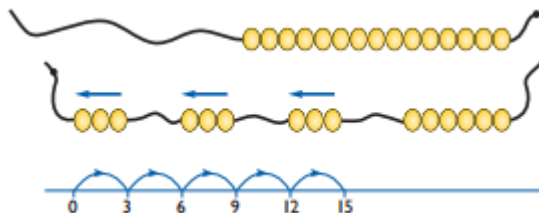
Know and understand sharing and grouping- introducing children to the \div sign.

Children should continue to use grouping and sharing for division using practical apparatus, arrays and pictorial representations.

Grouping using a numberline

Group from zero in jumps of the divisor to find our 'how many groups of 3 are there in 15?'

$15 \div 3 = 5$



Continue work on arrays. Support children to understand how multiplication and division are inverse. Look at an array – what do you see?

Division Year 3

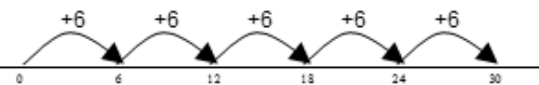
\div = signs and missing numbers

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

Grouping

How many 6's are in 30?

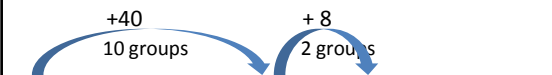
$30 \div 6$ can be modelled as:



Becoming more efficient using a numberline

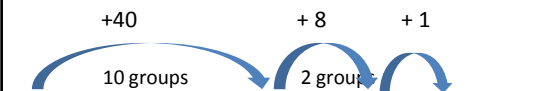
Children need to be able to partition the dividend in different ways.

$48 \div 4 = 12$



Remainders

$49 \div 4 = 12 \text{ r}1$



Sharing – 49 shared between 4. How many left over?

Grouping – How many 4s make 49. How many are left over?

Place value counters can be used to support children apply their knowledge of grouping.

For example:

$60 \div 10 =$ How many groups of 10 in 60?

$600 \div 100 =$ How many groups of 100 in 600?

Division Year 4

\div = signs and missing numbers

Continue using a range of equations as in year 3 but with appropriate numbers.

Sharing, Grouping and using a number line

Children will continue to explore division as sharing and grouping, and to represent calculations on a number line until they have a secure understanding. Children should progress in their use of written division calculations:

- Using tables facts with which they are fluent
- Experiencing a logical progression in the numbers they use, for example:
 - Dividend just over 10x the divisor, e.g. $84 \div 7$
 - Dividend just over 10x the divisor when the divisor is a teen number, e.g. $173 \div 15$ (learning sensible strategies for calculations such as $102 \div 17$)
 - Dividend over 100x the divisor, e.g. $840 \div 7$
 - Dividend over 20x the divisor, e.g. $168 \div 7$

All of the above stages should include calculations with remainders as well as without.

Remainders should be interpreted according to the context. (i.e. rounded up or down to relate to the answer to the problem)



Jottings

$$7 \times 100 = 700$$

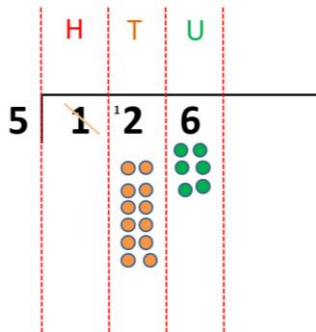
$$7 \times 10 = 70$$

$$7 \times 20 = 140$$

Formal Written Methods

Formal short division should only be introduced once children have a good understanding of division, its links with multiplication and the idea of 'chunking up' to find a target number (see use of number lines above)

Short division to be modelled for understanding using place value counters as shown below. Calculations with 2 and 3-digit dividends. E.g. fig 1

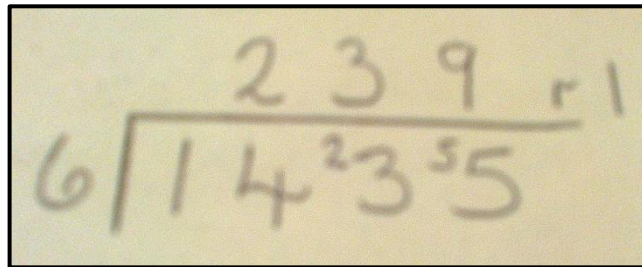


Division Year 5

Formal Written Methods

Continued as shown in Year 4, leading to the efficient use of a formal method. The language of grouping to be used (see link from fig. 1 in Year 4)

E.g. $1435 \div 6$



Children begin to practically develop their understanding of how express the remainder as a decimal or a fraction. Ensure practical understanding allows children to work through this (e.g. what could I do with this remaining 1? How could I share this between 6 as well?)

Division Year 6

\div = signs and missing numbers

Continue using a range of equations but with appropriate numbers

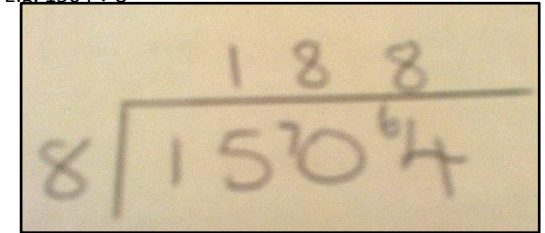
Sharing and Grouping and using a number line

Children will continue to explore division as sharing and grouping, and to represent calculations on a number line as appropriate.

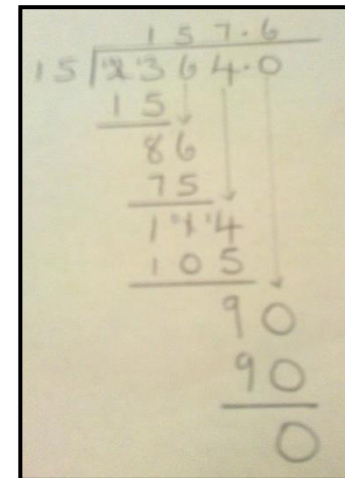
Quotients should be expressed as decimals and fractions

Formal Written Methods – long and short division

E.g. $1504 \div 8$



E.g. $2364 \div 15$



Year 1 objectives

Statutory requirements

Pupils should be taught to:

- 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.

Year 1 guidance

Notes and guidance (non-statutory)

Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.

They make connections between arrays, number patterns, and counting in twos, fives and tens.



Year 2 objectives

Statutory requirements

Pupils should be taught to:

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals ($=$) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Year 2 guidance

Notes and guidance (non-statutory)

Pupils use a variety of language to describe multiplication and division.

Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.

Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. They begin to relate these to fractions and measures (for example, $40 \div 2 = 20$, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, $4 \times 5 = 20$ and $20 \div 5 = 4$).



Year 3 objectives

Statutory requirements

Pupils should be taught to:

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- 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.



Year 3 guidance

Notes and guidance (non-statutory)

Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.

Pupils develop efficient mental methods, for example, using commutativity and associativity (for example, $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (for example, using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts (for example, $30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$).

Pupils develop reliable written methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication and division.

Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).

