Mathematics Calculation Policy
Key Stage 1 and 2





Pupils should be taught the use of expanded and then column method for addition.

| 6374 <br> $\frac{2823}{9197}$$+$$\frac{6874}{7}$ <br> The amount carried over can be <br> placed above or below the line |
| :--- | ---: |

1

## Compact written method

Extend to numbers with at least four digits.

$$
789+642 \text { becomes }
$$

$$
\begin{array}{r}
2634 \\
+4517 \\
\hline 7151 \\
\hline
\end{array}
$$

As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.


$$
\begin{aligned}
& \text { The addition symbol } \\
& \text { can be on the left or } \\
& \text { the right of the } \\
& \text { calculation. }
\end{aligned}
$$

## Problem Solving

Teachers should ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding.

All the missing digits are the same. Find the missing digits.

$$
\begin{array}{r}
522470 \\
+305904 \\
\hline 900302 \\
\hline
\end{array}
$$

Whole unknown:
3 children go to the cinema. They each pay £13.75. How much do they spend altogether?

| $?$ |  |  |
| :---: | :---: | :---: |
| 13.75 | 13.75 | 13.75 |



| 1 | 11 3 4 5 6 7 | 8 | 9 | 10 |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |



This can progress all the way to counting back using two 2 digit numbers.

$100-30=70$

Introduce expanded column subtraction with no decomposition, modelled with place value counters or dienes e.g-364-122
For some children this will lead to exchanging, modelled using place value counters or base ten.

| 908 |
| ---: |
| -305 |
| 603 |

$70 \cdot 2$


Bar modelling should be used to help solve missing number problems


A pencil has a length of 15 cm .
An eraser has a length of 6 cm .
How much longer is the pencil than the eraser? 15


## Year 1

Through grouping and sharing small quantities, pupils begin
to understand doubling numbers and quantities. The
children can count in twos, fives and tens.
Understand multiplication is related to doubling and
combing groups of the same size (repeated addition)

double 4 is
$4 \times 2=8$

## Year 2

Children practise and become fluent in the 2,5 and 10 multiplication tables. They connect the 10 multiplication table to place value.
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).

$5+5+5=15$
O

$$
\begin{aligned}
& 5 \times 3=15 \\
& 3 \times 5=15
\end{aligned}
$$

$3+3+3+3+3=15$

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


## Year 3

Practise their recall of multiplication tables and through doubling they connect the 2, 4 and 8 multiplication tables.

Doubling 2 digit numbers using partitioning - using jottings from Year 2.
Written methods (progressing to 2d x 1d)
Developing written methods using understanding of visual images.
Show the link with arrays to first
introduce the grid method.

$$
\begin{aligned}
& 808008080808 \text { of } 10 \\
& 06060606806 \text { 4 rows }
\end{aligned}
$$

Move on to using Base 10 to move towards a more compact method.

| $\times$ | Tens | ones |
| :---: | :---: | :---: |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

4 rows of 13

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.


Fill each row with 126.
 vocabulary relating to 'times' -
Pick up five, 4 times. Use arrays to understand multiplication can be done in any order (commutative)

$$
\begin{aligned}
& 0000^{4 \times 2=8} \\
& 0000^{2 \times 4=8} \\
& 00 \\
& 00 \\
& 00 \\
& 00
\end{aligned}
$$




## Year 1

Through sharing small quantities, children begin to
understand division, and finding simple fractions of amounts
and quantities.
Children must have secure counting skills- being able to confidently count in $2 \mathrm{~s}, 5 \mathrm{~s}$ and 10 s . 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.

$$
15 * 5=3
$$

15 shared between 5


## Grouping

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

$15 \div 3=5$

Arrays
Use of arrays as a pictorial representation for division. $15 \div 3$ = 5 There are 5 groups of 3 .

## Year 2

Children practise and become fluent in their recall of the 2,5 and 10 division facts.

Sharing using a bar model
$12 \div 3=$ ?

| $?$ | $?$ | $?$ |
| :---: | :---: | :---: |
| 12 |  |  |

## Grouping on a number line

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


## Arrays

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

\section*{| -10 | 0 |
| :--- | :--- | <br> $0-0$}

$3 \times 4=12$
$12 \div 4=3$
Missing number problems.
-•••••
!!:!
$20=\square \times 5 \quad 3=\square \div 6$

## Year 3

Children practise and become fluent in the recall of the 2,3,4 and
8 division facts.

## Becoming more efficient using a numberline

Children need to be able to partition the dividend in different ways.
$48 \div 4=12$


Extending divisions to resemble written method of short division

## 23

3

$69 \div 3=23$

Progressing to the formal written method of short division:
23
$3 \longdiv { 6 9 }$

| $\begin{aligned} & \frac{c}{0} \\ & \frac{1}{n} \\ & 0 \end{aligned}$ | Year 4 | Year 5 | Year 6 |
| :---: | :---: | :---: | :---: |
|  | Children should know all the division facts up to $12 \times 12$ | Undertake mental divisions with increasingly hard numbers and decimals. | Undertake mental divisions with increasingly hard numbers and decimals. |
|  | Use base 10 blocks to divide by 10 $140 \div 10=14$ <br> Grouping/sharing counters are used to make the link with short division <br> Leads directly onto: $\begin{gathered} 023 \\ 6 \longdiv { 1 3 1 } \\ 138 \div 6=23 \end{gathered}$ | Showing remainder as a whole number: $3 \longdiv { 2 ^ { 2 } 5 ^ { 1 } 7 ^ { 2 } 6 } r ^ { 2 }$ <br> Answer: 858 remainder 2 <br> Showing remainder as a fraction: $3 \longdiv { 2 ^ { 2 } 5 ^ { 1 } 7 ^ { 2 } 6 } { } ^ { 8 5 }$ <br> Answer: $858 \frac{2}{3}$ <br> HTU $\div$ TU (Using factor pairs as divisors) $558 \div 18=$ <br> Step 1: Identify a pair of factors for the divisor e.g. $18=3 \times 6$ <br> Step 2: Divide by one of the factors. <br> Step 3: Divide the answer by the other $3 \longdiv { 1 8 6 } \quad \begin{array} { r }  { 3 1 } \\ { 5 ^ { 2 } 5 ^ { 1 } 8 } \\ { 1 ^ { 1 } 8 6 } \end{array}$ factor. <br> HTU $\div$ TU (beginning to look at <br> precursor to $\begin{array}{rll} 4 & & \text { long division) } \\ \$ 158 \\ -\frac{360}{198} & (20 \times 18) & \\ -\frac{180}{18} & (10 \times 18) \\ -\frac{18}{0} & (1 \times 18) \end{array}$ <br> Answer: $558 \div 18=31$ | $\doteqdot$ = signs and missing numbers <br> Continue using a range of equations but with appropriate numbers <br> Sharing and Grouping and using a number line <br> Children will continue to explore division as sharing and grouping, and to represent calculations on a number line as appropriate. Remainders should be expressed as decimals and fractions. <br> $496 \div 11$ becomes <br> Answer: $45 \frac{1}{11}$ <br> Long Division |

