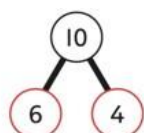


Written Calculation Policy 2024 - 2025

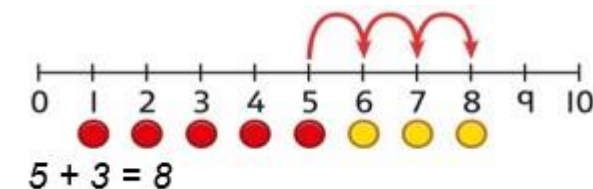
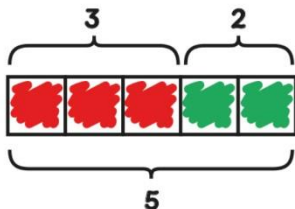
Year 1

Addition

Children work through concrete and pictorial representation of addition before being introduced to counting on using a number line. Pictorial representation can be in many forms, e.g. part, part, whole models; ten frames, dienes, etc.



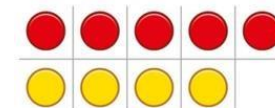
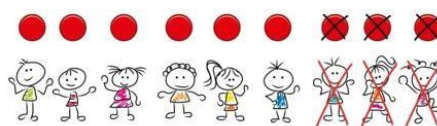
$$6 + 4 = 10$$



Counting on in ones is represented in jumps above a numbered number line.

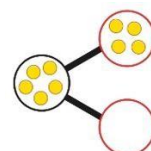
Subtraction

Children work through concrete and pictorial representation of subtraction before being introduced to counting back using a number line. The inverse link between addition and subtraction is reinforced by finding a missing part, and finding the difference.

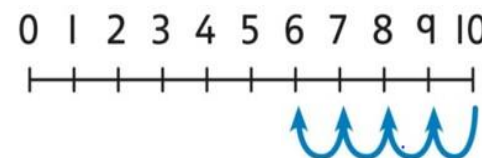


$$5 - 4 = 1$$

The difference between 5 and 4 is 1.



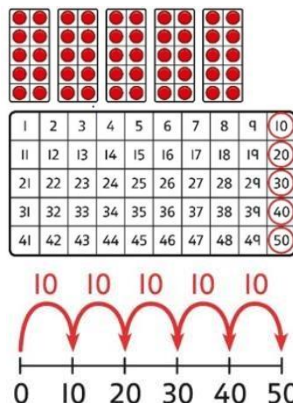
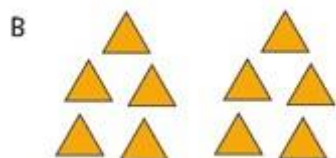
$$5 - 4 = \square$$



Counting back is represented in jumps below a numbered numberline.

Multiplication

Children work through concrete and pictorial representation of multiplication, drawing and representing equal groups. A number line is introduced to support the concept of multiplication as repeated addition using multiples of twos, fives and tens, supported with use of base ten and a 100 square.

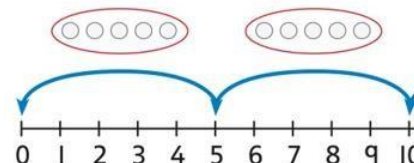
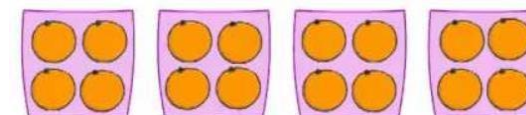


Division

Children work through concrete and pictorial representation of division, drawing and representing division through grouping and sharing. Grouping is related to counting backwards on a number line in multiples of twos, fives and tens.



There are 10 in total.
There are 5 in each group.
There are 2 groups.



Year 2

Addition

Counting on from the largest value using an empty number line is revised before introducing expanded column method, up to TO + TO, starting with adding values that do not bridge the tens boundary.

No bridging

5	2	+	1	7		
5	0	+	1	0	=	6 0
2	+	7	=	9		
6	0	+	9	=	6 9	

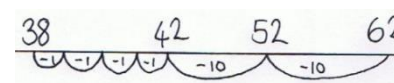
Bridging required

5	2	+	2	9		
5	0	+	2	0	=	7 0
2	+	9	=	1 1		
7	0	+	1	1	=	8 1

Subtraction

Using an empty number line is used, partitioning the number to count back in tens then in ones under the line. Children are encouraged to find a small difference by counting up. Later in the year, children are introduced to the partitioning method, first without bridging the tens, then when secure, bridging tens using their knowledge of number bonds.

Number line



Partitioning

6	5	-	2	8		
6	5	-	2	0	=	4 5
4	5	-	8	=	3 7	

Multiplication

Children use arrays to understand the relationship between multiplication and repeated addition, equal grouping and commutativity. A blank number line is used for repeated addition.

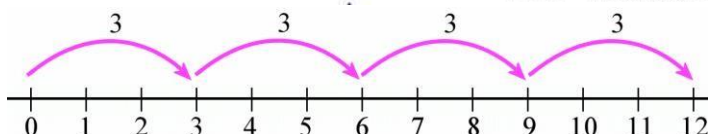


This is 2 groups of 6 and also 6 groups of 2.

$$4 + 4 + 4 + 4 + 4 = 20$$

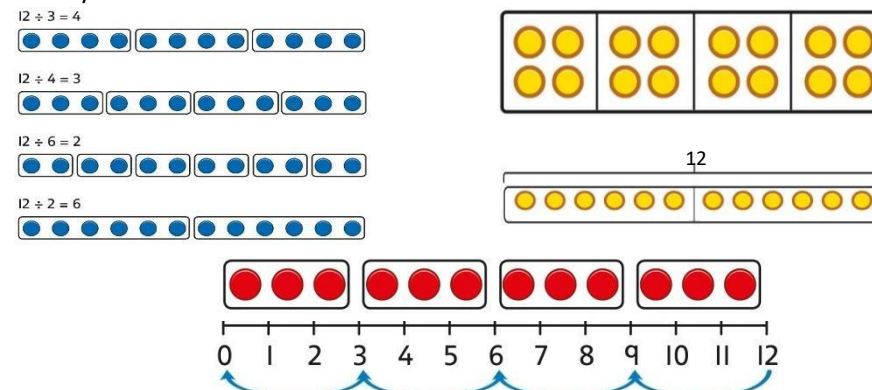
$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20 \text{ and } 5 \times 4 = 20$$



Division

Division is represented pictorially as grouping and sharing, with links made to knowledge of times tables facts: *I know that 3 groups of 10 makes 30, so I know that 30 divided by 10 is 3.* Bar models are used to reinforce equal grouping and repeated addition/subtraction.



Year 3

Addition

Using expanded method is revised then, when confident and proficient, standard column addition is introduced, up to HTO + HTO, starting with adding values that require no exchanging of value. Any value to be exchanged is recorded below the total as a full-size digit.

Expanded Method

$$\begin{array}{r} 52 + 17 \\ 50 + 10 = 60 \\ 2 + 7 = 9 \\ 60 + 9 = 69 \end{array}$$

No Exchange

$$\begin{array}{r} 52 \\ + 17 \\ \hline 69 \end{array}$$

Exchange required

$$\begin{array}{r} 52 \\ + 29 \\ \hline 81 \\ 1 \end{array}$$

Subtraction

Using empty number lines as a method for subtraction and expanded method is revised. When confident and proficient, standard column subtraction is introduced, up to HTO - HTO, using the language 'exchange' not borrow. Subtracting values that require no exchanging of value are mastered before introducing. Any value to be exchanged is recorded below the total as a full size digit. Children are encouraged to find a small difference by counting up.

Expanded Method

$$\begin{array}{r} 65 - 23 \\ 60 - 20 = 40 \\ 5 - 3 = 2 \\ 40 + 2 = 42 \end{array}$$

No Exchange

$$\begin{array}{r} 65 \\ - 23 \\ \hline 42 \end{array}$$

Exchange required

$$\begin{array}{r} 5 \\ 815 \\ - 28 \\ \hline 37 \end{array}$$



Multiplication

Where possible children are encouraged to use their known multiplication facts and understanding of place value to derive related facts. For example: *I know that $6 \times 2 = 12$ so $6 \times 20 = 120$.* Short multiplication is introduced, first using the expanded method before introducing the compact method with any value to be exchanged recorded below the total as a full-size digit.

Expanded Method

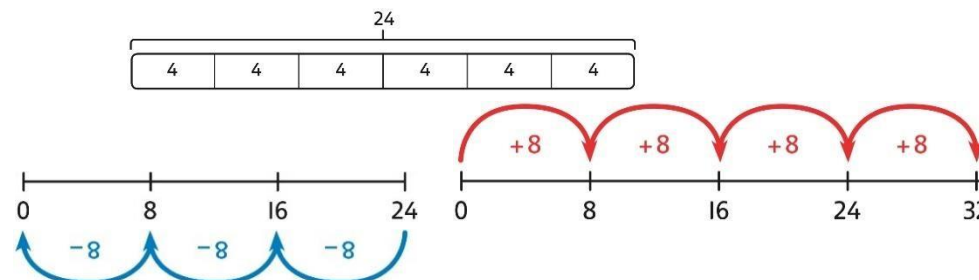
	2	6
x		3
	1	8
	6	0
	7	8

Compact method

	2	6
x		3
	7	8
	1	

Division

Children are encouraged to use their known multiplication facts to understand the relationship between multiplication & division, using repeated addition or subtraction. Pictorial representations such as bars are used, and a number line is used for repeated addition or subtraction.



Year 4

Addition

Standard column method is used up to value of ThHTO + ThHTO. Any value to be exchanged is recorded below the total as a full-size digit.

	3	6	4
+		7	8
	4	4	2
	1	1	

	6	2	4	8
+	1	4	2	6
	7	6	7	4
			1	

Subtraction

Standard column method used, subtracting units first, using the language 'exchange' not borrow for values up to ThHTO - ThHTO.

	5		
-	8	4	
	5	2	4

	4		
-	4	2	5
	4	8	2



Multiplication

Where possible children are encouraged to use their known multiplication facts and understanding of place value to derive related facts. For example: $8 \times 21 = 168$ - *I know that 8×2 is 16, so 8×20 is 160, then I add one more eight to find 168.* Standard column multiplication is used, using compact method if confident and proficient up to $HTO \times O$.

Expanded

	3	2	4	
x				3
			1	2
		6	0	
	9	0	0	
	9	7	2	

Compact

	3	2	4	
x				3
	9	7	2	
		1		

Division

Standard short division is introduced for 2-digit then 3-digit values divided by a single-digit divisor. To start, problems with whole number answers are presented before introducing remainders. Children are encouraged to estimate first before calculating.

Without remainder

	1	0	8	
3	3	2	4	

With remainder

	1	0	8	r2
3	3	2	6	

Years 5 & 6



Addition

Years 5 & 6 use the same column method as in year 4 continuing to use the least significant digit first, adding numbers up to 5-digits, and also be working with decimals up to 2-decimal points.

$$\begin{array}{r} 23,624 \\ + 6,038 \\ \hline 29,662 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 26.8 \\ + 13.14 \\ \hline 39.94 \end{array}$$

Subtraction

Years 5 & 6 use the same standard method of decomposition where adjusting is required. They will be subtracting numbers up to 5-digits and more complex decimals.

$$\begin{array}{r} 54 \\ - 2,428 \\ \hline 3,826 \end{array}$$

$$\begin{array}{r} 2 \\ - 16.1 \\ \hline 18.1 \end{array}$$

Multiplication

Years 5 & 6 use standard column method for multiplying multiple-digit values by a single-digit factor. For multiplying by a two or three-digit factor, children are taught the Chinese Lattice method of multiplication - NB. if the child is comfortable with long-multiplication, they can choose the method they feel is most appropriate for them. For both methods, estimating is always used first.

Column

$$\begin{array}{r} 2,643 \\ \times 9 \\ \hline 23,787 \\ \hline 532 \end{array}$$

Long Multiplication

$$\begin{array}{r} 623 \\ \times 45 \\ \hline 3,115 \\ 24,920 \\ \hline 28,035 \\ \hline 1 \end{array}$$

Chinese Lattice

$$\begin{array}{r} 623 \\ \times 45 \\ \hline 3,115 \\ 24,920 \\ \hline 28,035 \end{array}$$

623 x 45 = 28,035

Division

Standard short division is revised and use of the remainder is applied in context - whether to round up, round down, leave a remainder or to continue to decimals up to 2dp (for example in money). For 2-digit divisors, please see division appendix.

No remainder

$$\begin{array}{r} 131 \\ 6 \overline{) 786} \end{array}$$

Remainder

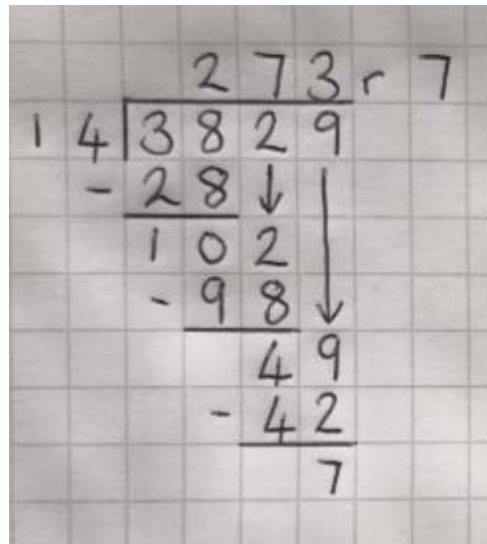
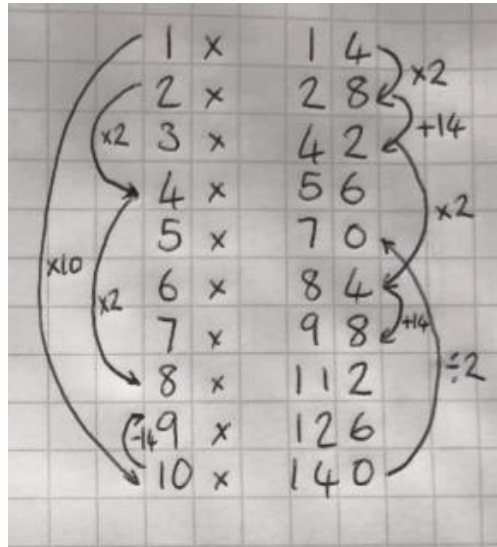
$$\begin{array}{r} 131 \text{ r}3 \\ 6 \overline{) 789} \end{array}$$

Decimal remainder

$$\begin{array}{r} 131.5 \\ 6 \overline{) 789.0} \end{array}$$



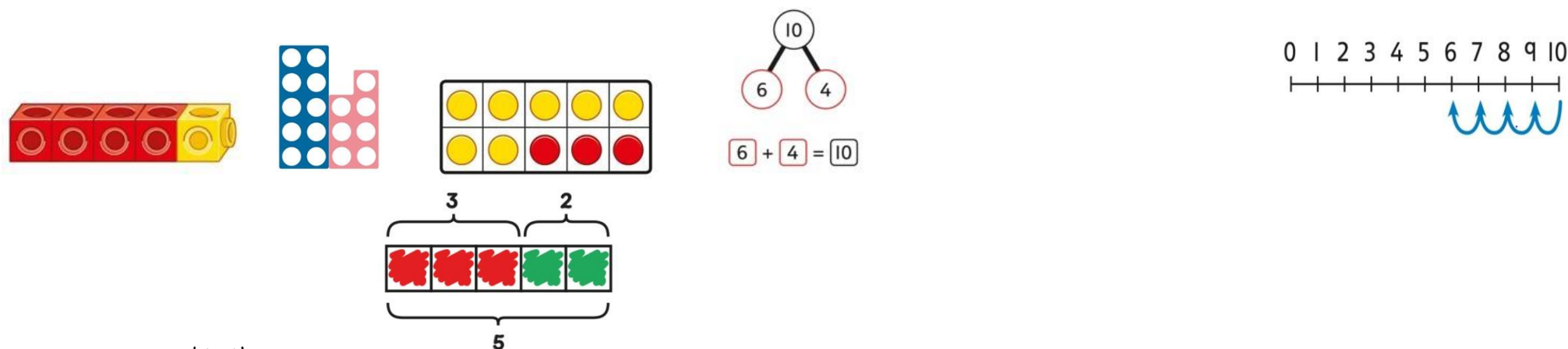
For two-digit divisors, Year 6 are taught the long-division method. First they calculate $1\times$, $2\times$, $5\times$ & $10\times$ the divisor; then $4\times$ & $8\times$ using doubling; then the remaining multiples using addition, subtraction or doubling. When confident, not all multiples of the divisor need to be calculated unless necessary. The method follows the subtraction/drop-down method. Remainders after calculation are interpreted, unless an obvious fraction or decimal.



$$3,829 \div 14 = 273 \text{ r } 7$$
$$\frac{7}{14} = \frac{1}{2} = 0.5 \text{ or } 273.5$$

Visual Representations of Number

At Windrush, continuing the Concrete, Pictorial, Abstract approach from Reception, we use a variety of representations of number to ensure that our learners do not just associate numbers with numerical digits. Below is an example of the variety of visual representations that can be used, with a rough progression in which



learners are exposed to them.

unifix

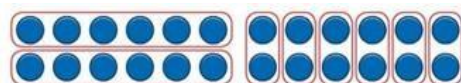
Numicon

ten frames

part-part-whole models

additive bar models

number lines



H	T	O
		



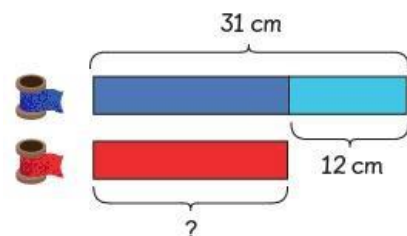
18		
6	6	6

arrays

place value chart / counters

dienes

multiplicative bar model



315	
185	?

$$315 - 185 = ?$$

$$185 + ? = 315$$

I II III IV
VI VII VIII
X XI XII

comparative bar models

difference bar models

Roman numerals