



# Calculation Policy

## **Guidance**

This calculation policy has been written in line with the programmes of study taken from the revised National Curriculum for Mathematics (2014). It provides guidance on appropriate calculation methods and progression. The content is set out in year groups under the following headings: addition and subtraction, multiplication and division. The end of year expectations taken from the programmes of study are listed in bold at the beginning of each section.

The 2014 National Curriculum states that ‘the expectations’ is that the majority of pupils will move through the programmes of study at broadly the same pace’ and that ‘pupils who grasp concepts rapidly should be challenged through rich and sophisticated problems before any new acceleration through new content’.

This policy guides teachers in progression for each operation to ensure smooth transition through the year groups. It is important that conceptual understanding, supported by the use of representations, is secure for procedures, and if at any point a pupil is struggling with a procedure, they should revert to concrete representations or methods from previous year groups to solidify understanding. Whilst teachers may go back to previous year groups to support understanding, they should not be moving up through the year groups; instead children should be challenged to demonstrate a broad understanding.

**Year 1**

**Addition & Subtraction**

**End of Year Expectations**

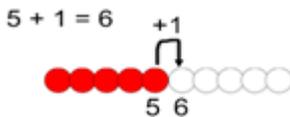
- I can read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs
- I can use number bonds and related subtraction facts within 20
- I can add and subtract 1-digit and 2-digit numbers to 20, including zero
- I can solve missing problems such as  $7 = ? - 9$

**Addition**

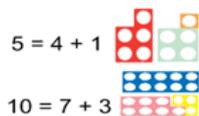
The first step for addition is to combine two groups using a hoop. The total of the two groups is recorded as a simple number sentence.



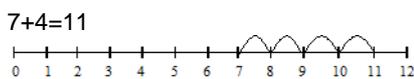
Next add one to any number using a number line or set of beads.



Next move on to adding two amounts to find the number bonds to ten. Numicon could be used to show this visually.



The next step is to use a number line to count on in ones. Children use number lines and practical resources to support calculation and the teacher demonstrates the use of the number line.

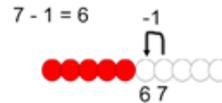


**Subtraction**

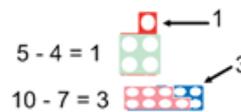
As with addition start with group of objects and record the numeral. Take some away, record and count what's left. e.g. '6 take away 3 is 3 OR 3 less than 6 is 3'



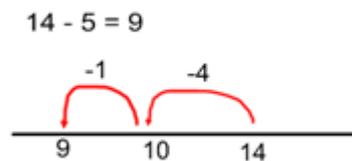
Next find one less on a number line or set of beads.



Children should then be able to find the inverse of number bonds. Again consider using numicon.



The next step is to use a number line to count/jump back.



**Key Vocabulary**

Add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line

**Mental Strategies/Starters**

- Counting to 10/20 and back
- Counting on from any number
- Locating numbers on a number line/100 square
- Finding pairs of numbers
- Number bonds/facts activities

**Key Vocabulary**

Take, take away, less, minus, subtract, leaves, how many fewer, less than, least, count back, how many left

**Mental Strategies/Starters**

- Counting to 10/20 and back
- Counting back from any number
- Locating numbers on a number line/100 square
- Finding the inverse
- Place value/partitioning

Year 1

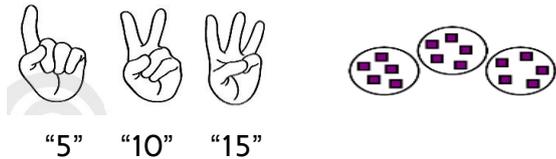
Multiplication & Division

**End of Year Expectations**

- I can to solve one-step problems involving multiplication and division, by calculating the answer using arrays with the support of the teacher

**Multiplication**

Start by teaching children to add repeatedly using counters or fingers.



$5 \times 3 = 15$  is the same as  $5 + 5 + 5 = 15$

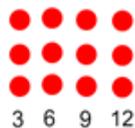
Teach that multiplication is related to doubling and counting groups of the same size.



$3 + 3$

Next move on to arrays:

$3 \times 4 = 12$



Read out the calculations as:  $3 \times 4$  '3, multiplied 4 times'. Ensure that children understand that this is a group of 3, repeated 4 times. Emphasise that children don't count individual dots, but count up rows / columns

**Division**

The first step for dividing is understanding that when solving a 'sharing' problem, they can solve it quicker through grouping.

$9 \div 3 = 3$



Children should have lots of opportunities for sharing / grouping using practical apparatus.

Children should have the opportunity to sort objects into 2s / 3s / 4s  
e.g. How many pairs of socks are there?

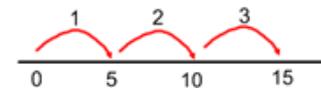


There are 12 bulbs. Plant 3 in each pot. How many pots are there?

Jo has 12 Lego wheels. How many cars can she make?

Some children may move on to using a number line:

$15 \div 5 = 3$



**Key Vocabulary**

Groups of, lots of, times, array, altogether, multiply, count, all together

**Key Vocabulary**

Share, share equally, one each, two each..., group, groups of, lots of, array

**Mental Strategies/Starters**

Counting in steps of 2, 5 and 10.  
Times tables songs  
Times Tables bingo  
Interactive maths games

**Mental Strategies/Starters**

Halving/sharing games  
Times tables facts  
Times table bingo

## Year 2

### Addition & Subtraction

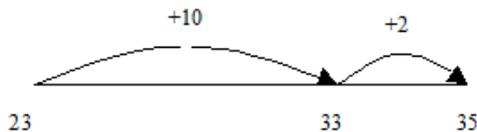
#### End of Year Expectations

- I can recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- I can add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a 2-digit number and ones, a 2-digit number and tens, two 2-digit numbers, adding three 1-digit numbers
- I can show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another
- I can recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems

#### Addition

The next step in adding is counting on in tens and ones (jumping in 10s):

$$\begin{aligned} 23 + 12 &= 23 + 10 + 2 \\ &= 33 + 2 \\ &= 35 \end{aligned}$$



Emphasise **jump** on number line, not counting!  
Use number bonds to jump to the next ten on the number line. Then add what is left in one jump.

Next move on to the partitioned column method:

$$\begin{array}{r} \text{TU + TU } 36 + 45 \\ \quad 30 + 6 \\ + \quad 40 + 5 \\ \hline 70 + 11 = 81 \end{array}$$

Once children can add a multiple of ten to a 2 digit number mentally (e.g.  $80 + 11$ ), they are ready for adding pairs of 2 digit numbers that do cross the tens boundary (e.g.  $58 + 43$ ).

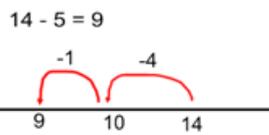
#### Subtraction

Next children should be taught to take away by comparing two sets (comparison or difference)



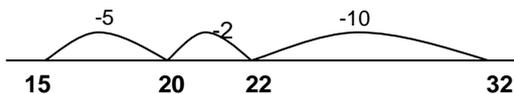
$$12 - 5 = 7$$

As in Year 1 children should subtract by counting back using a number line:



Next children learn to partition the second number and subtract it in tens and then units, as below:

$$32 - 17$$



$$32 - 17 = 15$$

Teaching children to bridge through ten will help them to become more efficient.

#### Key Vocabulary

Add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary

#### Key Vocabulary

Take, take away, less, minus, subtract, leaves, how many fewer, less than, least, count back, how many left? how much less is? difference, count on, strategy, partition, tens, units

#### Mental Strategies/Starters

Rapid recall of addition facts  
Number bonds  
Adding to a ten mentally  
( $10 + 2 = 12$ ,  
 $10 + 3 = 13$   
 $10 + 4 = 14...$ )  
Counting on in tens

#### Mental Strategies/Starters

Counting on and back in tens Focus on tricky parts: counting over 100, counting back past 20 in the teen numbers.  
Practice partitioning  
Number bonds up to ten (to avoid counting in ones subtracting columns)

**Year 2**

**Multiplication & Division**

**End of Year Expectations**

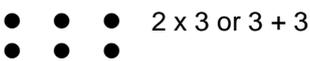
- I can recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- I can calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs
- I can show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

**Multiplication**

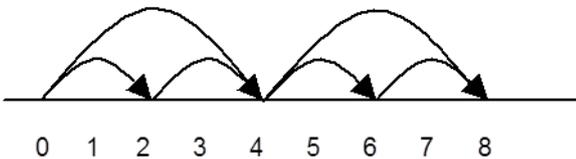
In year 2 children learn that multiplication can be carried out using arrays or repeated addition:



$3 + 3 = 6$  or 2 groups of 3 is 6



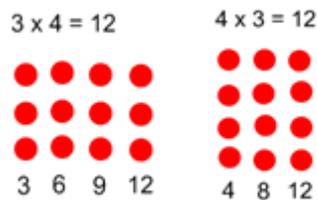
Next they move on to repeated addition on a number line:



**Inverse  $2 \times 4$  or  $2 + 2 + 2 + 2$**

**Division**

Arrays can be used to explain 'related facts':



$3 \times 4 = 12$        $4 \times 3 = 12$

So  $12 \div 4 = 3$       and  $12 \div 3 = 4$

Next move onto using a number line:

$18 \div 3$  can be modelled as:  
Sharing – 18 shared between 3  
How many 3's make 18?



**Teaching remainders:**

Sharing - 16 shared between 3, how many left over?  
Grouping – How many 3's make 16, how many left over?  
e.g.



$16 \div 3 = 5 \text{ r}1$

**Key Vocabulary**

Groups of, lots of, times, array, altogether, multiply, count, all together, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, as big as, once, twice, three times...

**Key Vocabulary**

Share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, groupings, number line, left, left over

**Mental Strategies/Starters**

Counting in steps of...2, 5 and 10  
Times tables songs  
Times Tables bingo  
Interactive maths games  
Doubling & halving rapid recall

**Mental Strategies/Starters**

Times table songs  
Times tables facts  
Times table bingo  
Halving (use Numicon / bead bars / counters)  
Odd and even number games

## Year 3

### Addition & Subtraction

#### End of Year Expectations

- I can add and subtract numbers mentally.
- I can add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction
- I can estimate the answer to a calculation and use inverse operations to check answers
- I can solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

#### Addition

In Year 3 children continue to use the partitioned column method:

$$\begin{array}{r} \text{TU} + \text{TU} \quad 36 + 45 \\ \quad \quad \quad 30 + 6 \\ + \quad \quad \quad 40 + 5 \\ \hline \quad \quad \quad 70 + 11 = 81 \end{array}$$

Then introduce the expanded column method as children move to adding numbers with up to three digits:

$$\begin{array}{r} 247 \\ + 376 \\ \hline 13 \\ 110 \\ \hline 500 \\ \hline 623 \end{array}$$

Moving on to compact column method:

$$\begin{array}{r} 247 \\ + 376 \\ \hline 623 \\ \small{11} \end{array}$$

Working from right to left:

"7 + 6 is 13. Partition the 13 into 10 and 3, 'carry' the ten into the tens column, writing it as 1 to represent one ten." It is NOT "carry the 1".

For this method children need to recognise the value of the hundreds, tens and units without recognising the partitioning. Children need to be able to add in place value columns.

#### Subtraction

In Year 3 introduce the partitioned column subtraction method:

$$\begin{array}{r} 89 - 35 = 54 \\ 80 + 9 \\ \hline -30 + 5 \\ \hline 50 + 4 \end{array}$$

(Start by introducing examples where no exchanging of tens and units is required.)

You could use diennes to support visually.

When learning to 'exchange', explore partitioning in different ways so that pupils understand that when they exchange the value remains the same i.e.

$$72 = 70 + 2 = 60 + 12 = 50 + 22 \text{ etc}$$

Emphasise to children that the value does not change. We have just partitioned it in a different way.

#### Key Vocabulary

Add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, expanded, compact

#### Key Vocabulary

Take, take away, less, minus, subtract, leaves, how many fewer, less than, least, count back, how many left? how much less is? difference, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit

#### Mental Strategies/Starters

Counting on in tens  
Adding to a ten mentally  
Practice partitioning  
Number bonds up to ten

#### Mental Strategies/Starters

Counting on and back in tens Focus on tricky parts: counting over 100, counting back past 20 in the teen numbers.  
Practice partitioning number bonds up to 20

**Year 3**

**Multiplication & Division**

**End of Year Expectations**

- I can recall and use multiplication and division for the 3,4 and 8 times tables
- I can write and calculate mathematical statements for multiplication and division using the multiplication facts that they know including TU x U, using mental and then progressing to formal written methods.
- I can solve problems, including missing number problems, involving multiplication and division, including integer scaling problems and correspondence problems in which n objects are connected to m objects

**Multiplication**

Multiply 2 digits by a single digit number.

Now introduce the grid method for multiplying 2 digit by single digit:

x	20	3
8	160	24

Then add together the two amounts:

$$160 + 24 = 184$$

You may want to introduce the grid method physically making an array to represent the calculation ( make 8 lots of 10s and 1s place value counters), then translate this to the grid method format.

Children need to check their answer by making a sensible guess:

23 x 7 is approximately 20 x 10 = 200

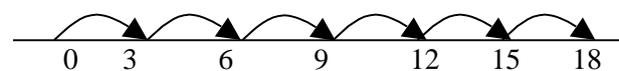
x	20	3	
7	140	21	= 161

**Division**

Dividing two digits numbers by 1 digit numbers.

Start by recapping on the number line method:

$$18 \div 3 =$$



$$18 \div 3 = 6$$

When children are secure with division as grouping and demonstrate this using a number line, short division for larger 2-digit numbers should be introduced. Initially do not introduce remainders,

Next move on to the standard 'Goes Into' or 'Bus Stop' method:

$$\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$$

When the children are ready teach them how to carry out the method when there are remainders within the calculation:

$$\begin{array}{r} 14 \\ 5 \overline{) 720} \end{array}$$

**Key Vocabulary**

Groups of, lots of, times, array, altogether, multiply, count, all together, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value

**Key Vocabulary**

Share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, groupings, number line, left, left over, inverse, short division, carry, remainder, multiple

**Mental Strategies/Starters**

Recall of 2, 3, 4, 5, 8 and 10 times tables  
Missing number problems  
Times Tables bingo  
Interactive maths games

**Mental Strategies/Starters**

HALVING (use Numicon / Bead Bars / counters)  
Counting in steps of  
Times tables rapid recall  
Partitioning

## Year 4

### Addition & Subtraction

#### End of Year Expectations

- I can add and subtract numbers up to 4 digits using column methods
- I can estimate and use inverse operations to check answers to a calculation
- I can solve addition and subtraction two-step problems in contexts, deciding which operations to use and why

#### Addition

In Year 4 children move from the expanded addition to the compact column method, adding units first, and 'carrying' numbers underneath the calculation. They will apply this through money and measuring contexts.

Children use the compact method to add numbers with up to 4 digits.

Model with the expanded method and then show how the compact method can be used.

e.g.  $3517 + 396 = 3916$

$$\begin{array}{r}
 + 3517 \\
 \underline{396} \\
 3913 \\
 11
 \end{array}$$

Remind children to start with the units first and remind them of the value of the digits e.g. the 5 is actually 5 hundreds and the 1 is one ten etc.

#### Subtraction

In year 4 children move to subtraction by standard decomposition or compact method. As with addition use examples with money or measurements.

Expanded method (as taught in Year 3)

$$\begin{array}{r}
 600 \qquad \qquad 1 \\
 700 \quad + \quad 50 \quad + \quad 4 \\
 - (500 \quad + \quad 60 \quad + \quad 2) \\
 \hline
 100 \quad + \quad 90 \quad + \quad 2 = 192
 \end{array}$$

Compact method

$$\begin{array}{r}
 6 \ 1 \\
 754 \\
 - 562 \\
 \hline
 192
 \end{array}$$

Remember to give the children plenty of opportunities to apply what they have learnt to measurements and money, and real life contexts.

Always encourage children to consider the best method for the numbers involved – mental, counting on, counting back or the standard written method.

#### Key Vocabulary

Add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, expanded, compact, thousands, hundreds, digits, inverse

#### Key Vocabulary

Take, take away, less, minus, subtract, leaves, how many fewer, less than, least, count back, how many left? how much less is? difference, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit, inverse

#### Mental Strategies/Starters

Find 1000 more or less than a given number  
 Numbers bonds, number facts, near doubles, partitioning and recombining  
 Solving real life problems  
 Estimating and checking  
 Rounding to the nearest 10, 100 and 1000

#### Mental Strategies/Starters

Estimate and use inverse to check  
 Solve simple measure and money problems involving mental subtraction  
 Find 10, 100, 100 more or less than a given number  
 Count backwards through zero, including negative numbers  
 Recognising place value of any given 4 digit number

## Year 4

### Multiplication & Division

#### End of Year Expectations

- I can recall multiplication and division facts up to 12x12
- I can use place value, known and derived facts to multiply and divide mentally, including multiplying and dividing by 0 and 1; dividing by 1; multiplying together three numbers
- I can recognise and use factor pairs and commutativity in mental calculations
- I can multiply two-digit and three-digit numbers by a one digit number using a formal layout
- I can find the effect of dividing a one- or two- digit number by 10 and 100, identifying the value of the digits in the answer as units, tenths and hundredths
- I can solve problems involving multiplying and adding, including integer scaling problems and harder correspondence problems such as n objects are connected to m objects

#### Multiplication

In Year 4 children develop the grid method to multiply 2 and 3 digit numbers by a single digit number using all the multiplication tables up to 12 x 12.

$$136 \times 5 = ?$$

x	100	30	6
5	500	150	30

$$500 + 150 + 30 = 680$$

Children should make an approximation before they calculate so that they can check the reasonableness of their answer.

When children are ready they should move on the short/compact multiplication

$$\begin{array}{r} 136 \\ \times \quad 5 \\ \hline 680 \\ 13 \end{array}$$

Ask children the similarities between using the grid and compact method. Unpick the steps and show the children that it reduces the steps and is more efficient.

#### Division

In Year 4 children divide up to 3 digit numbers by a single digit using the short / bus stop method.

Pupils must be secure with the process of short division for dividing 2 digit numbers by a single digit

$$\begin{array}{r} 18 \\ \hline 4 \overline{) 72} \\ \underline{72} \\ 0 \end{array}$$

Pupils then move onto dividing numbers with up to 3 digits by a single digit. However, problems and calculations provided should not result in a remainder at this stage.

$$\begin{array}{r} 218 \\ \hline 4 \overline{) 872} \\ \underline{872} \\ 0 \end{array}$$

Include real life contexts, money and measure where ever possible so that children gain a full understanding on when this method can be used as an efficient method of calculation.

#### Key Vocabulary

Groups of, lots of, times, array, altogether, multiply, count, all together, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, sets of, inverse

#### Key Vocabulary

Share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, groupings, number line, left, left over, inverse, short division, carry, remainder, multiple, divisible by, factor

#### Mental Strategies/Starters

Count in multiples of 6, 7, 9 and 25  
Recall multiplication facts for all the multiplication tables up to 12 x 12  
Recognise place value of digits up to 4 digit numbers  
Use place value, known facts to multiply mentally  
Find the inverse multiplication and division facts

#### Mental Strategies/Starters

Recall multiplication facts for all the multiplication tables up to 12 x 12  
Use place value, known and derived number facts to multiply and divide mentally, including multiplying and dividing by 10, 100 and 1000  
Use place value, known facts to multiply mentally  
Find the inverse multiplication and division facts



**Year 5**

**Addition & Subtraction**

**End of Year Expectations**

- I can add and subtract whole numbers with more than 4 digit using formal column addition
- I can add and subtract number mentally with increasingly large numbers
- I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- I can solve addition and subtraction multi-step problem in contexts, deciding which operations and methods to use and why

**Addition**

In Year 5 children learn to add numbers with more than 4 digits including money, measures and decimals using the column method.

$$£23.59 + £7.55$$

$$\begin{array}{r} £23.59 \\ £ 7.55 \\ \hline £ 31.14 \\ 1 \quad 1 \quad 1 \end{array}$$

Children must understand that the decimal point should be aligned in the same way as the other place value columns, and must be in the same column in the answer.

Children should be able to add more than two values, carefully aligning the place value columns and decimals.

$$\begin{array}{r} 19.01 \\ 3.65 \\ + 0.70 \\ \hline 23.36 \\ 1 \quad 1 \end{array}$$

Empty decimal places, such as in the third value above can be filled with a zero to show the place value line each column.

**Key Vocabulary**

Add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths

**Mental Strategies/Starters**

Find 1000 more or less than a given number  
Numbers bonds, number facts, near doubles, partitioning and recombining  
Solving real life problems  
Estimating and checking  
Rounding to the nearest 10, 100 and 1000

**Subtraction**

In Year 5 children subtract with increasingly larger numbers and decimal values.

Children should use the compact method to subtract money and measures.

$$\begin{array}{r} 1 \\ 6 \quad 1 \quad 1 \\ 7 \quad 2 \quad . \quad 5 \quad \text{km} \\ - \quad 4 \quad . \quad 6 \\ \hline 6 \quad 7 \quad . \quad 9 \quad \text{km} \end{array}$$

As with the compact column subtraction strategy it is vital that children understand what each column represents in terms of value.

*Children who are still not secure with number facts and place value will need to remain on the partitioned column method until ready for the compact method.*

Remember to create lots of opportunities for subtracting and finding differences with money and measures.

**Key Vocabulary**

Take, take away, less, minus, subtract, leaves, how many fewer, less than, least, count back, how many left? how much less is? difference, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, thousandths, decimal

**Mental Strategies/Starters**

Estimate and use inverse to check  
Solve simple measure and money problems involving mental subtraction  
Find 10, 100, 1000 more or less than a given number  
Count backwards through zero, including negative numbers  
Recognising place value of any given 4 digit number  
Use negative numbers and calculate intervals

## Year 5

### Multiplication & Division

#### End of Year Expectations

- I can identify multiples and factors, including finding all factor pairs of a number and common factors of two numbers
- I can multiply and divide numbers mentally using known facts
- I can divide numbers up to four digits by a one-digit number using the formal written method of short division and interpret remainders appropriately according to context
- I can solve problems using multiplication and division and combination of these, including understanding the equals sign
- I can solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple ratios
- I know and use the words prime number, prime factors and composite numbers

#### Multiplication

In Year 5 children multiply 4 digit numbers by 1 or 2 digits using the column method.

$$\begin{array}{r} 136 \\ \times \quad 5 \\ \hline 680 \\ 13 \end{array}$$

As in Year 4 compare the column method to the grid method and see how the steps are related. But notice that there are less steps involved in the column method making it quicker and more efficient.

Next move onto long multiplication for multiplying by two numbers.

$$\begin{array}{r} 18 \\ \times \quad 13 \\ \hline 54 \\ \phantom{54} 2 \\ \hline 180 \\ \hline 234 \end{array}$$

> 18 x 3 on the 1<sup>st</sup> row (8 x 3 = 24, carrying the 2 for the twenty, then 1 x 3)  
 . 18 x 10 on the 2<sup>nd</sup> row (put a zero in the units first, then say 8 x 1 and 1 x 1).

#### Division

In Year 5 children divide up to 4 digits by a single digit, including those with remainders.

$$\begin{array}{r} 0663r5 \\ \hline 8 \overline{) 5309} \\ \underline{5309} \\ 0 \end{array}$$

$$5309 \div 8 = 663 \text{ r}5$$

The answer could also be expressed as 663 and 'five eights', as a decimal or rounded up to 664, depending on the problem involved.

Remember to create lots of opportunities for dividing with money and measures.

#### Key Vocabulary

Groups of, lots of, times, array, altogether, multiply, count, all together, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, sets of, inverse, square, factor, integer, decimal, short/long multiplication

#### Key Vocabulary

Share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, groupings, number line, left, left over, inverse, short division, carry, remainder, multiple, divisible by, factor, quotient, prime number, prime factor, composite number (non-prime)

#### Mental Strategies/Starters

Count in multiples of 6, 7, 9 and 25  
 Recall multiplication facts for all the multiplication tables up to 12 x 12  
 Recognise place value of digits up to 4 digit numbers  
 Use place value, known facts to multiply mentally  
 Find the inverse multiplication and division facts

#### Mental Strategies/Starters

Recall multiplication facts for all the multiplication tables up to 12 x 12  
 Use place value, known and derived number facts to multiply and divide mentally, including multiplying and dividing by 10, 100 and 1000  
 Use place value, known facts to multiply mentally  
 Find the inverse multiplication and division facts



## Year 6

### Addition & Subtraction

#### End of Year Expectations

- I can perform mental calculations, including with mixed operations and large numbers
- I can use my knowledge of the order of operations to carry out calculations involving the 4 operations
- I can solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- I can use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

#### Addition

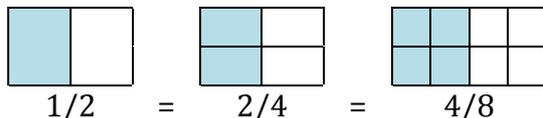
Children add any number of digits and decimals with 1, 2 and/or 3 decimal places.

$$\begin{array}{r}
 23.361 \\
 9.08 \\
 59.77 \\
 + 1.3 \\
 \hline
 93.511 \\
 \text{2 1 2}
 \end{array}$$

Revert to expanded methods if the children experience any difficulty.

Children should be able to add more than two values, carefully aligning the place value columns and decimals.

Children should be taught to add (and subtract) fractions with different denominators and mixed numbers, using the concept of equivalent fractions



Children should be taught to convert so that both fractions have the same denominator:

$$\frac{3}{5} + \frac{4}{7} \text{ (both denominators go into 35)} \\
 \frac{21}{35} + \frac{20}{35} = \frac{41}{35} \text{ (or } 1 \frac{6}{35})$$

#### Key Vocabulary

Add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths

#### Mental Strategies/Starters

Find 1000 more or less than a given number  
 Numbers bonds, number facts, near doubles, partitioning and recombining  
 Solving real life problems  
 Estimating and checking  
 Rounding to the nearest 10, 100 and 1000

#### Subtraction

Children should use the compact method to subtract money and measures.

$$\begin{array}{r}
 1 \\
 6 \ 1 \ 1 \\
 72.5 \text{ km} \\
 - 4.6 \text{ km} \\
 \hline
 67.9 \text{ km}
 \end{array}$$

In Year 6 children go on with using the compact method with increasingly large and more complex numbers and decimal values.

$$\begin{array}{r}
 0 \ 14 \ 9 \ 1 \\
 4510.699 \text{ km} \\
 - 89.949 \text{ km} \\
 \hline
 60.750 \text{ km}
 \end{array}$$

Children should be expected to use the compact column method to subtract money and measures, including decimals with different numbers of decimal places.

#### Key Vocabulary

Take, take away, less, minus, subtract, leaves, how many fewer, less than, least, count back, how many left? how much less is? difference, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, thousandths, decimal

#### Mental Strategies/Starters

Estimate and use inverse to check  
 Solve simple measure and money problems involving mental subtraction  
 Find 10, 100, 100 more or less than a given number  
 Recognising place value of any given 4 digit number  
 Use negative numbers and calculate intervals

## Year 6

### Multiplication & Division

#### End of Year Expectations

- I can multiply multi-digit numbers up to 4 digits by a two digit whole number using the formal written method of long multiplication
- I can divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions or by rounding, as appropriate for the context
- I can divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- I can perform mental calculations, including with mixed operations and large numbers
- I can identify common factors, common multiples and prime numbers.
- I can use my knowledge of the order of operations to carry out calculations involving the 4 operations
- I can multiply one-digit numbers with up to 2 decimal places by whole numbers
- I can use written division methods in cases where the answer has up to 2 decimal places solve problems which require answers to be rounded to specified degrees of accuracy
- I can solve problems involving multiplication and division
- I can use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

#### Multiplication

When children are secure with multiplication for TU x U and TU x TU they should have little difficulty in using the same method for HTU x TU.

$$\begin{array}{r}
 286 \\
 \times 29 \\
 \hline
 2574 \quad (9 \times 286 = 2574) \\
 5720 \quad (20 \times 286 = 5720) \\
 \hline
 8294 \\
 1
 \end{array}$$

Multiplying decimals:

$$\begin{array}{r}
 14.53 \\
 \times 4 \\
 \hline
 58.12 \\
 121
 \end{array}$$

Multiplying fractions:

Two fifths x Three sevenths  $\frac{2}{5} \times \frac{3}{7}$   
 Multiply numerators first  $\frac{2}{5} \times \frac{3}{7} = \frac{6}{?}$   
 Multiply denominators next  $\frac{2}{5} \times \frac{3}{7} = \frac{6}{35}$

#### Division

In Year 6 children should be taught to divide 3 digit numbers by two digit numbers. First by using chunking (use because bus stop method gets a bit confusing with all the extra digits), moving to the long division method.

##### Long division

<p>432 ÷ 15 becomes</p> $  \begin{array}{r}  28 \text{ r } 12 \\  15 \overline{) 432} \\  \underline{300} \\  132 \\  \underline{120} \\  12  \end{array}  $ <p>Answer: 28 remainder 12</p>	<p>432 ÷ 15 becomes</p> $  \begin{array}{r}  28 \\  15 \overline{) 432} \\  \underline{300} \quad 15 \times 20 \\  \underline{132} \quad 15 \times 8 \\  120 \\  \underline{12}  \end{array}  $ <p><math>\frac{12}{15} = \frac{4}{5}</math></p> <p>Answer: <math>28 \frac{4}{5}</math></p>	<p>432 ÷ 15 becomes</p> $  \begin{array}{r}  28.8 \\  15 \overline{) 432.0} \\  \underline{300} \quad \downarrow \\  \underline{132} \quad \downarrow \\  \underline{120} \quad \downarrow \\  120 \\  \underline{120} \\  0  \end{array}  $ <p>Answer: 28.8</p>
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With decimals use the standard method:

$$\begin{array}{r}
 87.5 \div 7 = \\
 12 \text{ r } 3.5 \\
 7 \overline{) 87.5} \\
 \underline{80} \\
 75 \\
 \underline{70} \\
 5
 \end{array}$$

For fractions flip' the 2nd fraction, then multiply:

$$\begin{array}{ccccccc}
 3 & \div & \frac{2}{3} & = & 3 & \times & \frac{3}{2} & = & \frac{9}{2} \\
 5 & & 3 & & 5 & & 2 & & 10
 \end{array}$$

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