



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

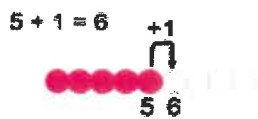
- I can read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs
- I can use number bonds and related subtraction facts within 20
- I can add and subtract 1-digit and 2-digit numbers to 20, including zero
- I can solve missing problems such as $7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

Addition

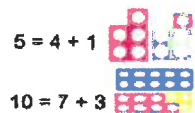
The first step for addition is to combine two groups using a hoop. The total of the two groups is recorded as a simple number sentence.



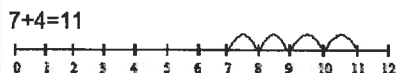
Next add one to any number using a number line or set of beads.



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.

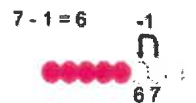


Subtraction

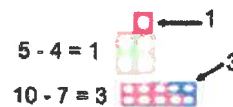
As with addition start with group of objects and record the numeral. Take some away, record and count what's left. e.g. '6 take away 3 is 3 OR 3 less than 6 is 3'



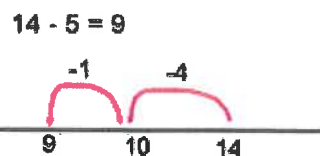
Next find one less on a number line or set of beads.



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" "10" "15"

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

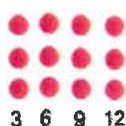
Teach that multiplication is related to doubling and counting groups of the same size.



$3 + 3$

Next move on to arrays:

$3 \times 4 = 12$



Read out the calculations as: 3×4 '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

Key Vocabulary

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

Mental Strategies/Starters

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

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?

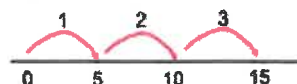


There are 12 bulbs. Plant 3 in each pot. How many pots are there?

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

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

Mental Strategies/Starters

Halving/sharing games
Times tables facts
Times table bingo

Year 2

Addition & Subtraction

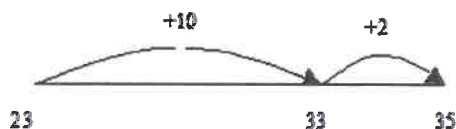
End of Year Expectations

- 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:

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

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. $58 + 43$).

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

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

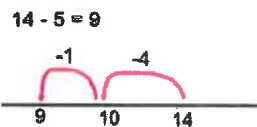
Subtraction

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



$$12 - 5 = 7$$

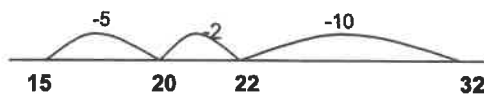
As in Year 1 children should subtract by counting back using a number line:



$$14 - 5 = 9$$

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

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

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:

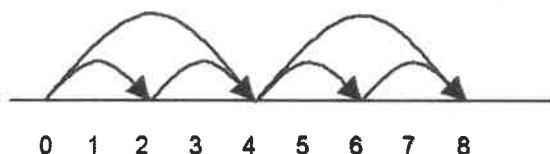


$3 + 3 = 6$ or 2 groups of 3 is 6

• • • 2 x 3 or 3 + 3
• • •

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

• • • • 4 x 2 or 4 + 4
• • • •

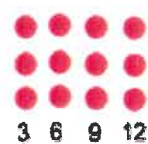


Inverse 2 x 4 or 2 + 2 + 2 + 2

Division

Arrays can be used to explain 'related facts':

$$3 \times 4 = 12$$



$$4 \times 3 = 12$$



$$3 \times 4 = 12$$

$$4 \times 3 = 12$$

$$\text{So } 12 \div 4 = 3$$

$$\text{and } 12 \div 3 = 4$$

Next move onto using a number line:

18 ÷ 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 <ul style="list-style-type: none"> 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: $\begin{array}{r} \text{TU} + \text{TU} \quad 36 + 45 \\ 30 + 6 \\ + \quad 40 + 5 \\ \hline 70 + 11 = 81 \end{array}$ Then introduce the expanded column method as children move to adding numbers with up to three digits: $\begin{array}{r} 247 \\ + 376 \\ \hline 13 \\ 110 \\ 500 \\ \hline 623 \end{array}$ Moving on to compact column method: $\begin{array}{r} 247 \\ + 376 \\ \hline 623 \\ 11 \end{array}$ Working from <u>right to left</u> : "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 <u>NOT</u> "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: $\begin{array}{r} 89 - 35 = 54 \\ 80 + 9 \\ - 30 + 5 \\ \hline 50 + 4 \end{array}$ (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. $72 = 70 + 2 = 60 + 12 = 50 + 22$ 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

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

Mental Strategies/Starters

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

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:

	3	2
3	9	6

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

	1	4
5	7	20

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

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

Year 4	
Addition & Subtraction	
End of Year Expectations <ul style="list-style-type: none"> 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 <p>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.</p> <p>Children use the compact method to add numbers with up to 4 digits.</p> <p>Model with the expanded method and then show how the compact method can be used.</p> <p>e.g. $3517 + 396 = 3916$</p> $ \begin{array}{r} + 3517 \\ + 396 \\ \hline 3913 \\ 11 \end{array} $ <p>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.</p>	Subtraction <p>In year 4 children move to subtraction by standard decomposition or compact method. As with addition use examples with money or measurements.</p> <p><u>Expanded method</u> (as taught in Year 3)</p> $ \begin{array}{r} 600 \quad 1 \\ 700 + 50 + 4 \\ - (500 + 60 + 2) \\ \hline 100 + 90 + 2 = 192 \end{array} $ <p><u>Compact method</u></p> $ \begin{array}{r} 61 \\ 754 \\ - 562 \\ \hline 192 \end{array} $ <p>Remember to give the children plenty of opportunities to apply what they have learnt to measurements and money, and real life contexts.</p> <p>Always encourage children to consider the best method for the numbers involved – mental, counting on, counting back or the standard written method.</p>
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, 1000 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

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

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.

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

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

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

$$\begin{array}{r} 18 \\ 4 \overline{) 72} \\ 4 \\ \hline 32 \\ 32 \\ \hline 0 \end{array}$$

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.

$$\begin{array}{r} 218 \\ 4 \overline{) 872} \\ 8 \\ \hline 72 \\ 72 \\ \hline 0 \end{array}$$

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

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

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 <ul style="list-style-type: none"> 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 <p>In Year 5 children learn to add numbers with more than 4 digits including money, measures and decimals using the column method.</p> <p>£23.59 + £7.55</p> $ \begin{array}{r} \text{£}23.59 \\ \text{£}7.55 \\ \hline \text{£}31.14 \\ 1\ 1\ 1 \end{array} $ <p>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.</p> <p>Children should be able to add more than two values, carefully aligning the place value columns and decimals.</p> $ \begin{array}{r} 19.01 \\ 3.65 \\ + 0.70 \\ \hline 23.36 \\ 1\ 1 \end{array} $ <p>Empty decimal places, such as in the third value above can be filled with a zero to show the place value line each column.</p>	Subtraction <p>In Year 5 children subtract with increasingly larger numbers and decimal values.</p> <p>Children should use the compact method to subtract money and measures.</p> $ \begin{array}{r} 6\ 1\ 1 \\ 72.5\text{ km} \\ - 4.6\text{ km} \\ \hline 67.9\text{ km} \end{array} $ <p>As with the compact column subtraction strategy it is vital that children understand what each column represents in terms of value.</p> <p><i>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.</i></p> <p>Remember to create lots of opportunities for subtracting and finding differences with money and measures.</p>
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	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 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 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.

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

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.

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

> 18 x 3 on the 1st row (8 x 3 = 24, carrying the 2 for the twenty, then 1 x 3)
 . 18 x 10 on the 2nd 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.

$$\begin{array}{r} 0663r5 \\ 8 \overline{) 5309} \\ \underline{40} \\ 130 \\ \underline{120} \\ 100 \\ \underline{96} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

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

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

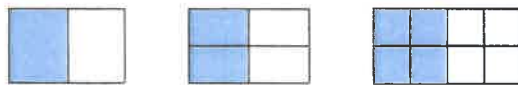
Children add any number of digits and decimals with 1, 2 and/or 3 decimal places.

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

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

$$\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$$


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.

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

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

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

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, 1000 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 × U and TU × TU they should have little difficulty in using the same method for HTU × TU.

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

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

$432 \div 15$ becomes

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{30} \\ 13 \\ \underline{12} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

Answer: 28 remainder 12

$432 \div 15$ becomes

$$\begin{array}{r} 28 \\ 15 \overline{) 432} \\ \underline{30} \\ 13 \\ \underline{12} \\ 12 \\ \underline{12} \\ 0 \end{array} \quad \begin{array}{l} 15 \times 20 \\ 15 \times 8 \end{array}$$

$$\frac{11}{15} = \frac{4}{3}$$

Answer: $28 \frac{4}{3}$

$432 \div 15$ becomes

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 13 \\ \underline{12} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

Answer: 28.8

With decimals use the standard method:

$$87.5 \div 7 =$$

$$\begin{array}{r} 12 \text{ r } 3.5 \\ 7 \overline{) 87.5} \\ \underline{56} \\ 31 \\ \underline{28} \\ 3 \\ \underline{21} \\ 20 \\ \underline{14} \\ 6 \end{array}$$

For fractions flip the 2nd fraction, then multiply:

$$\frac{3}{5} \div \frac{2}{5} = \frac{3}{5} \times \frac{5}{2} = \frac{9}{2}$$

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

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

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

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