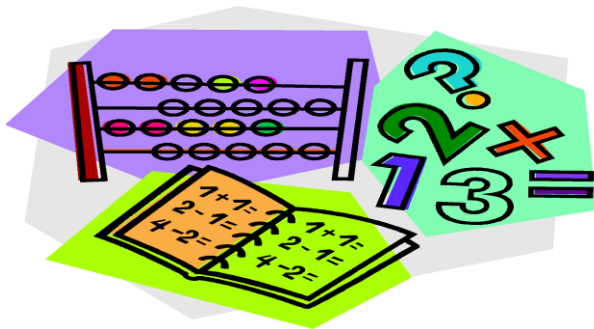


# BEAUFORT PRIMARY SCHOOL

## CALCULATION POLICY

This calculation policy is intended to bring consistency, continuity and progression as methods build upon each other from Reception to Year 6. Rapid recall strategies and mental calculation methods will serve to reinforce and supplement these written methods. This is necessary as the written calculations outlined in this policy rely on mental strategies to process numbers efficiently and with confidence.



*Our aims : all pupils become fluent in the fundamentals in mathematics, are able to reason mathematically and solve problems by applying their knowledge to a variety of problems*

## RECEPTION - CALCULATION POLICY 2017

By the end of RECEPTION (FS2) children should be confident in the following areas of number strategies

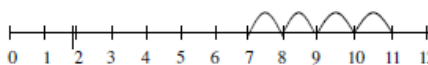
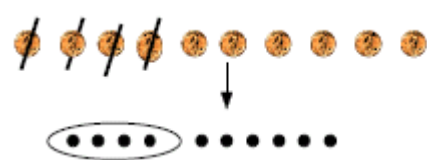
### ADDITION AND SUBTRACTION - FOUNDATION STAGE

- ★ Count reliably with numbers from 1-20 e.g have a secure understanding of numbers up to 20, counting objects and recognising numbers accurately
- ★ To count out a specified number of things from a larger collection e.g coins, beads, counters, bricks and pencils
- ★ Place numbers 1-20 in order e.g can the children help sort out the mixed up numbers on a washing line?
- ★ Say which number is one more or less than a given number up to 20 e.g in practical contexts with everyday objects (using fingers to model the numbers) the child is able to find one more or less - 'There are 13 children on a bus. One more gets on. How many children are there now?'
- ★ Use quantities and objects, they add 2 single digit numbers and count on to find the answer e.g use everyday objects, find how many there are in two groups by combining and counting them
- ★ Using quantities and objects, they subtract 2 single digit numbers and count back to find the answer e.g use everyday objects, the child says how many are left when some are eaten, taken away or hidden, by counting them, taking some away then counting those that are left
- ★ Solve problems, including doubling and halving and sharing e.g exploring practical problems in a range of real or role play contexts such as doubling, halving, grouping and sharing, using their own methods e.g the child finds different ways of separating 10 objects into 2 groups, pair knives and forks, share food etc



## YEAR 1 - CALCULATION POLICY 2017

1) Count to numbers across 100, forwards and backwards, beginning with 0 or 1, or from any given number 2) Count, read and write numbers to 100 in numerals, count in multiples of two, fives and tens 3) Given a number, identify one more or less than 4) Read and write numbers from 1 to 20 in numerals and words. 5) Children should discuss and solve problems in familiar contexts, including quantities. Problems should include the terms: put together, add altogether, total, take away, distance between, difference between, more than, less than. 6) Pupils should count in fractions up to 10 -halves and quarters

Addition	Subtraction	Multiplication	Division
<p>Record simple mental addition using + and =</p> <p>Be able to complete number sentences where a missing number is shown by a symbol.</p> $3 + 4 = \underline{\quad}$ $3 + \underline{\quad} = 7$ <p>Record addition by showing jumps on prepared number lines or moving onto higher numbers with the hundred square:</p> $7 + 4 = \underline{\quad}$  <p>Teacher models using numbered line or hundred square.</p>	<p>Record simple mental subtractions using - and =</p> <p>Record simple subtractions using pictures / marks:</p> <p>Understand subtraction as take away. Sam has 10p. I take away 4p from him. How much does he have left?</p>  <p>Be able to complete number sentences where a missing number is shown by a symbol.</p> $7 - 3 = \underline{\quad}$ $7 - \underline{\quad} = 4$	<p>Recall doubles of all the numbers to at least 10 and recall the corresponding halves.</p> <p>Count on or back in 1's, 2's, 5's and 10's</p> <p>Through grouping and sharing small quantities, pupils begin to understand : multiplication and division; doubling numbers and quantities; and finding simple fractions of objects numbers and quantities</p> <p>Solve one step problems involving multiplication and division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher</p>	<p>Solve one step problems involving multiplication and division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher</p> <p>Recognise, find and name a half as one of two equal parts of an object, shape or quantity</p> <p>Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity</p>

Add and subtract one digit and two digit numbers to 20 including zero

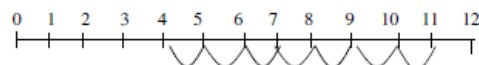
### MORE ABLE

Using a hundred square to add two numbers together to include TU + U. Move Away from number lines to using fingers.

Pupils memorise and reason with number bonds within 10 and 20 in several forms for example,  $9+7=16$  ;  $16-7=9$  ;  $7=16-9$

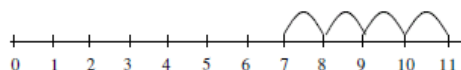
Solve one step problems that involve addition and subtraction using concrete objects and pictorial representations and missing number problems such as  $7 = \square - 9$

Use a number line to count back: e.g.  $11 - 7 =$

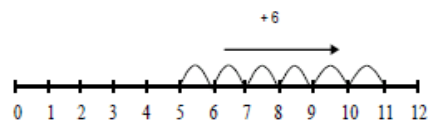


**Higher Ability Children could move into finding the difference (Yr 2 objective)**

Find 'a difference' by counting up: e.g. What is the difference between 11 and 7?



This will lead to worded problems:  
I have saved 5p. The socks I want to buy are 11p. How much more do I need to buy the socks?



## YEAR 2 - CALCULATION POLICY 2017

Add and subtract numbers using concrete objects, pictorial representations and mentally, including; 1) a two-digit number and ones 2) a two digit number and tens 3) two two- digit numbers 4) adding three one-digit numbers 5) Show that addition of 2 numbers can be done in any order(commutative) and subtraction of one number from another cannot **6) Count in steps of 2 and 5 from 0, and in tens from any number, forwards and backwards** 7) Recall and use multiplication and division facts for the 2,5 and 10 multiplication tables, including odd and even numbers 8) Pupils should partition numbers in different ways e.g  $23 = 20+3$  and  $23 = 10+13$  9) Solve simple problems in a practical context involving addition of money of the same unit, including giving change

Addition	Subtraction	Multiplication	Division
<p>Record mental addition using + and =</p> <p>Be able to complete number sentences where a missing number is shown by a symbol.</p> <p>E.g <math>9 + \_ = 13</math>  <math>14 + 5 = 10 + \_</math>  <math>\_ + \_ = 14</math>  <math>5 + \_ + 4 = 15</math>  <math>25 = 1 + \_ + 5</math>  <math>12 + \_ = 14 + 4</math></p> <p>Pupils practice addition and subtraction to 20 to become fluent in deriving facts such as using <math>3+7=10</math>; <math>10-7=3</math> and <math>7+10-3</math> so <math>30+70=100</math>; <math>100-70=30</math> and <math>70=100-30</math></p>	<p>Record simple mental subtractions using - and =</p> <p>Be able to complete missing number sentences:            e.g <math>18 - 4 = 14</math>  <math>9 + 6 = 20 - \_</math>  <math>14 + 5 = 20 - \_</math></p> <p>Understand when it is sensible to count back e.g. <math>18 - 5</math> and when to count on e.g. <math>18 - 13</math>.</p> <p>Use a number line to find a small difference by counting up.            E.g. <math>42 - 39 = 3</math></p> <div style="text-align: center;"> </div> <p>Use a number line or a hundred square to bridge through a multiple of 10            e.g. <math>22 - 5 = 17</math></p>	<p>Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20 and the corresponding halves.</p> <p>Record simple mental multiplication using x and =</p> <p>Represent problems involving multiplication using pictures and symbols:            There are 3 sweets in one bag.            How many sweets are there in 5 bags?</p> <div style="text-align: center;"> </div>	<p>Understand the concept of division as <b><u>sharing</u></b> and <b><u>grouping</u></b>:</p> <p>Represent problems using <b><u>pictures and symbols</u></b>: 12 children need to get into teams of 4 to play a game. How many teams are there?</p> <div style="text-align: center;"> </div> <p><b><u>Sharing</u></b>: 6 sweets are shared between 2 people. How many do they have each?</p> <div style="text-align: center;"> </div>

Check addition and subtraction by adding in a different order  
Eg  $5+2+1 = 1+5+2 = 1+2+5$

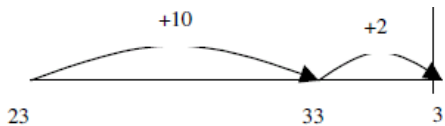
Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

$$3+2=5 \quad 2+3=5$$

$$5-2=3 \quad 5-3=2$$

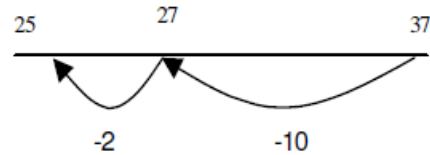
*Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers*

Use a hundred square. Start with the larger number in an addition where you must **bridge through the tens barrier** and count on: This can also be reinforced using a number line, e.g.  $23 + 12 =$



This leads to children partitioning *second number only* to subtract:

$$\text{E.g. } 37 - 12 = 25$$

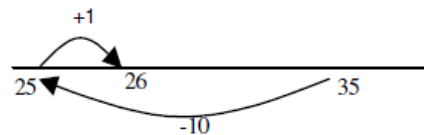


$$37 - 12 = \text{T} \quad 37 - 10 = 27$$

$$\text{U} \quad 27 - 2 = 25$$

Subtract 9 or 11 by taking away 10 and adjusting by 1 (using a hundred square)

$$\text{E.g. } 35 - 9 = 26$$



Be able to complete number sentences where a missing number is shown by a symbol:

$$7 \times 2 = \quad = 2 \times 7$$

$$7 \times \quad = 14 \quad 14 = \quad \times 7$$

$$\quad \times 2 = 14 \quad 14 = 2 \times \quad$$

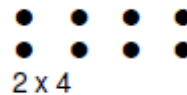
$$\quad \times \nabla = 14 \quad 14 = \quad \times \nabla$$

repeated addition and arrays:

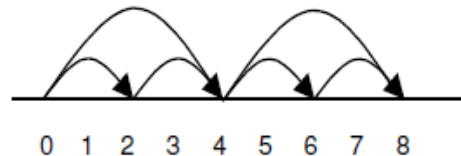
$$2 \times 4 = 4 + 4 = 8$$

$$2 \text{ lots of } 4 = 8$$

$$2 + 2 + 2 + 2 = 8$$

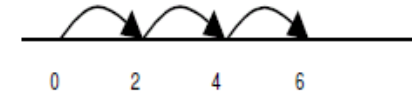


This can be modeled on a number line:



### Grouping:

$6 \div 2$  can be modelled mentally using fingers or illustrated using:



### Reminders:

Children are able to recognize that sometimes there might be times where division results in remainders being left over.

Record simple divisions using  $\div$  and  $=$

Be able to complete number sentences where a missing number is shown by a symbol:

$$6 \div 2 =$$

$$6 \div \quad = 3$$

Use a number line/ hundred square to add on multiples of 10. e.g.  $23 + 20$

Complete addition of two digit numbers:

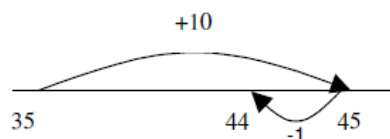
e.g.  $43 + 13$  by **partitioning** numbers into tens and ones and then recombining:

$$\begin{array}{r} 43 + 13 = \text{T} \quad 40 + 10 = 50 \\ \quad \quad \quad \text{U} \quad 3 + 3 = 6 \\ \quad \quad \quad \quad \quad 50 + 6 \\ \quad \quad \quad \quad \quad \quad = 56 \end{array}$$

Refine this to partitioning the second number *only to aid mental thinking*:

$$\begin{aligned} 43 + 13 &= 43 + 10 + 3 \\ &= 53 + 3 \\ &= 56 \end{aligned}$$

Embed the mental strategy to add 9 or 11 just add 10 and adjust by 1: e.g.  $35 + 9$



Partition the second number only in addition problems to aid mental thinking:

$$\begin{aligned} 43 + 13 &= 43 + 10 + 3 \\ &= 53 + 3 = 56 \end{aligned}$$

Lead into using standard written method without decomposition.

$$\begin{array}{r} \text{e.g.} \quad 48 \\ \quad \quad - 16 \\ \quad \quad \hline \quad \quad 32 \end{array}$$

\* Subtractions must be able to be completed without 'exchanging'

Solve simple problems in a practical context involving subtraction of money of the same unit, including giving change

Derive and recall multiplication facts for the 2, 5 and 10 times tables and the related division facts.

***To challenge HA children include 3 and 4 x tables within this.***

Use commutatively and inverse relations to develop multiplicative reasoning (for example,  $4 \times 5 = 20$  and  $20 \div 5 = 4$ ) They begin to relate these to fractions and measures e.g.  $40 \div 2 = 20$ , 20 is half of 40

Be able to find simple fractions of objects. Numbers and quantities

Find  $\frac{1}{2}$   $\frac{1}{4}$  of a quantity

Recognise, find and name a half as one of two equal parts of an object, shape or quantity

Write simple fractions e.g.

$\frac{1}{2}$  of 6 = 3

Recognise the equivalence of;

$\frac{2}{4}$  and  $\frac{1}{2}$


Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity

Find  $\frac{1}{3}$   $\frac{1}{4}$   $\frac{2}{4}$   $\frac{3}{4}$

of a length, shape, set of objects or quantity

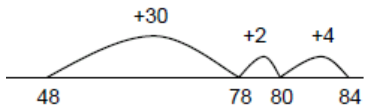
## YEAR 3 - CALCULATION POLICY 2017

Add and subtract numbers mentally, including 1) a three- digit number and ones 2) a three- digit number and tens 3) a three-digit number and hundreds 4) **RECALL MULTIPLICATION AND DIVISION FACTS FOR THE 3,4 AND 8 MULTIPLICATION TABLES** 5) Count from 0 in multiples of 4,8,50 and 100; find 10 or 100 more or less than a given number 6) Use larger numbers to at least 1000 and apply partitioning e.g  $146 = 100 + 40 + 6$ ,  $146 = 130 + 16$  7) Count up and down in tenths 8) Pupils should become fluent in recognizing the value of coins by adding and subtracting amounts including mixed units and giving change 9) Add and Subtract lengths(m/cm/mm); mass(kg/g); volume/capacity (l/ml)

Addition	Subtraction	Multiplication	Division
<p>Record mental addition using + and =</p> <p>Be able to complete number sentences where a missing number is shown by a symbol. E.g <math>19 + \underline{\quad} = 33</math> <math>\underline{\quad} + 14 = 33</math> <math>10 + \underline{\quad} + 50 = 100</math> <math>\underline{\quad} + \underline{\quad} + \underline{\quad} = 100</math> <math>347 + \underline{\quad} = 447</math></p> <p>Add a two digit number to a near multiple of 10 e.g. <math>35 + 19</math> is the same as <math>35 + 20 - 1</math></p>	<p>Record mental subtractions using - and =</p> <p>Be able to complete missing number sentences: e.g. <math>36 - 17 = \underline{\quad}</math> <math>\underline{\quad} - 15 = 19</math> <math>\underline{\quad} - \underline{\quad} = 19</math> <math>20 - \underline{\quad} - \underline{\quad} = 5</math></p> <p>Find a small difference by counting up: e.g. <math>102 - 97 = 5</math></p> <p>Use empty number line or a hundred square to subtract TU from TU (There is no need for chn to write these out in books) e.g. <math>97 - 15 = 72</math></p> 	<p>Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20 and the corresponding halves.</p> <p>Record simple mental multiplication using x and = and understand that multiplication is the <b>inverse</b> of division and vice versa.</p> <p>Be able to complete number sentences where a missing number is shown by a symbol: e.g. <math>6 \times \underline{\quad} = 18</math> <math>6 \times 10 = \underline{\quad}</math> <math>20 = \underline{\quad} \times 5</math> <math>\underline{\quad} \times 3 = 18</math> <math>\underline{\quad} \times \underline{\quad} = 24</math></p>	<p>Record divisions using <math>\div</math> and = Understand that division is the <b>inverse</b> of multiplication and vice versa.</p> <p>Be able to complete number sentences where a missing number is shown by a symbol: (see yr 2 examples and adjust numbers accordingly)</p> <p>Introduce division as <b>grouping</b> (<i>repeated addition</i>) as in Year 2. e.g. <math>20 \div 4</math></p> <div style="text-align: right;"> <p>1 •••••</p> <p>2 •••••</p> <p>3 •••••</p> <p>4 •••••</p> </div>



Use empty number lines initially to **demonstrate** mental addition:



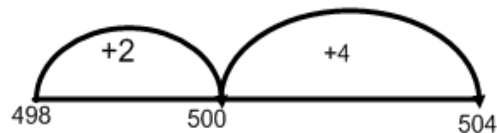
Partition the second number only in addition problems to aid mental thinking:

$$\begin{aligned} 43 + 13 &= 43 + 10 + 3 \\ &= 53 + 3 \\ &= 56 \end{aligned}$$

Move then onto expanded methods of vertical standard addition **adding the most significant digits** first to support mental strategies:

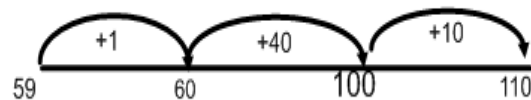
$$\begin{array}{r} 67 \\ + 85 \\ \hline 140 \text{ (representing } 60 + 80) \\ \underline{12} \text{ (representing } 7 + 5) \\ 152 \end{array}$$

Find a small difference by adding up e.g.  $504 - 498$



Subtract a multiple of 10 from a 2/3 digit number e.g.  $76 - 30$   $135 - 70$

Subtract a two-digit number from a 2/digit number-use a number line and count on from the smaller number-reach a multiple of 10 and then add on e.g.  $110 - 59$



Subtract mentally a near multiple of 10 by taking away multiple of 10 and adjusting by 1  
E.g.  $78 - 49$  is the same as  $78 - 50 + 1$

Derive and recall multiplication facts for the 2, 3, 4, 5, 6 and 10 times tables and the related division facts.

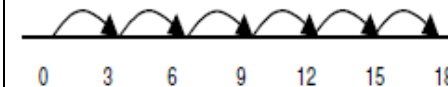
Continue to use repeated addition / arrays to help children understand the concept of multiplication. Number lines can be used to model mental strategies:  
E.g.  $6 \times 3 = 18$



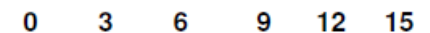
Use known facts to solve multiplication/ division facts e.g.

$$\begin{aligned} 6 \times 3 &= 18 \text{ so } 6 \times 30 = 180 \\ 3 \times 6 &= 18 \text{ so } 30 \times 6 = 180 \\ 18 \div 3 &= 6 \text{ so } 180 \div 30 = 6 \\ 18 \div 6 &= 3 \text{ so } 180 \div 6 = 30 \end{aligned}$$

Use a number line to model grouping. E.g. How many 3's make 18? (6)



Also understand division as **sharing** (repeated subtraction) e.g.  $15 \div 3 = 5$



Also understand that division may result in remainders. e.g.  $16 \div 3 = 5 \text{ r}1$

**Sharing:** 16 cakes are shared between 3 children, how many are left over?

Estimate the answer to a calculation and use inverse operations to check the answer

$$67 + 85 = 152 \quad 85 + 67 = 152$$

$$152 = 85 + 67 \quad 152 - 67 = 85$$

Add numbers with up to three digits, using formal written methods of column subtraction

Expand to HTU + TU  
Standard written method

$$\begin{array}{r} \text{e.g.} \quad 435 \\ \quad + 124 \\ \hline 559 \end{array}$$

Leading to 'carrying' below the line

$$\begin{array}{r} \text{e.g.} \quad 625 \\ \quad + 148 \\ \hline 773 \\ \quad 1 \end{array}$$

Add fractions with the same denominator within one whole

$$\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$$

Subtract multiples of 5 from 100 by counting up e.g. 100 - 35

Lead into using standard written method without decomposition.

$$\begin{array}{r} \text{e.g.} \quad 48 \\ \quad - 16 \\ \hline 32 \end{array}$$

Subtract numbers with up to three digits, using formal written methods of column subtraction

$$\begin{array}{r} 548 \\ - 216 \\ \hline 332 \end{array}$$

When understanding is secure pupils may move onto DECOMPOSITION of 2/3 digit numbers

Subtract fractions with the same denominator within one whole

$$\frac{5}{7} - \frac{1}{7} = \frac{4}{7}$$

Subtract amounts of money to give change, using both £ and p in practical contexts

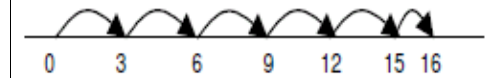
Pupils develop efficient mental methods eg using commutativity and associativity e.g.  $(4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240)$  and multiplication and division facts ( $3 \times 2 = 6$ ,  $6 \div 3 = 2$  and  $2 = 6 \div 3$ ) to derive related facts ( $30 \times 2 = 60$ ,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

Write and calculate mathematical statements for multiplication using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

$$\begin{array}{l} \text{e.g.} \\ 16 \times 5 = 10 \times 5 = 50 \\ \quad 6 \times 5 = 30 \\ 50 + 30 = 80 \end{array}$$

$$\begin{array}{l} 24 \times 3 = 20 \times 3 = 60 \\ \quad 4 \times 3 = 12 \\ 60 + 12 = 72 \end{array}$$

**Grouping:** How many groups of 3 can I make from 16 cakes?



$$\text{Find } \frac{1}{3} \quad \frac{1}{4} \quad \frac{2}{4} \quad \frac{3}{4}$$

Of a length, shape, set of objects or quantity

Be able to count up and down in tenths, recognizing that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10

## YEAR 4 - CALCULATION POLICY 2017

1) Count in multiples of 6,7, 9,25 and 1000- by the end of Year 4 be able to recall multiplication and division facts for multiplication tables up to  $12 \times 12$  2) Recognise the place value of each digit in a four-digit number e.g  $3523 = 3000+500+20+3$  3) Round any number to the nearest 10, 100 and 1000 4) Pupils should solve two- step questions choosing the appropriate operation 5) Pupils should connect hundredths to tenths and place value and decimal measure 6) Convert between different units of measure e.g kilometre to metre; hour to minute 7) Solve problems involving converting from hours to minutes, minutes to seconds, years to months; weeks to days 8) Use understanding of place value and decimal notation to record metric measures, including money

Addition	Subtraction	Multiplication	Division
<p>Be able to <b>complete number sentences</b> where a missing number is shown by a symbol. E.g <math>54 + \underline{\quad} = 100</math> <math>\underline{\quad} + 14 = 39</math> <math>10 + \underline{\quad} + 50 = 120</math> <math>\underline{\quad} + \underline{\quad} + \underline{\quad} = 100</math> <math>347 + \underline{\quad} = 547</math></p> <p>Add the <b>nearest multiple of 10</b> and then adjust e.g. <math>63 + 29</math> is the same as <math>63 + 30 - 1</math></p> <p>Use <b>DISTRIBUTIVE LAW</b> to solve addition problems e.g <math>\underline{54} + \underline{63} = 110 + 7 = 117</math></p>	<p>Record mental subtractions using - and = Be able to complete missing number sentences: e.g. <math>100 - 17 = \underline{\quad}</math> <math>\underline{\quad} - 15 = 50</math> <math>\underline{\quad} - \underline{\quad} = 20</math> <math>100 - \underline{\quad} - \underline{\quad} = 10</math></p> <p>Find a small difference by counting up: e.g. <math>503 - 496 = 7</math></p> <p>Subtract mentally a near multiple of 10 by taking away a multiple of 10 and adjusting by 1 E.g. <math>78 - 49</math> is the same as <math>78 - 50 + 1</math></p>	<p>Identify the doubles of two-digit numbers, use these to calculate mentally doubles of multiples of 10 and 100 and derive the corresponding halves.</p> <p>Pupils practice mental methods and extend this to three-digit numbers to derive facts (for example <math>600 \div 3 = 200</math> can be derived from <math>2 \times 3 = 6</math>)</p> <p>Use <b>DISTRIBUTIVE LAW</b> <math>39 \times 7 = 30 \times 7 + 9 \times 7 = 210 + 63 = 273</math></p> <p>Use <b>ASSOCIATIVE LAW</b> <math>(2 \times 3) \times 4 = 2 \times (3 \times 4)</math></p>	<p>Introduce short division method' Begin with TU <math>\div</math> U and include remainders: E.g. <math>96 \div 6 = 16</math></p> <p>When children are happy with the understanding here - model the <b>short division</b> method:</p> $\begin{array}{r} 16 \\ 6 \overline{) 936} \end{array}$ <p>Extend to HTU <math>\div</math> U</p> $\begin{array}{r} 122 \\ 6 \overline{) 71312} \end{array}$

Add numbers up to 4 digits using the formal written methods of addition

Expand to HTU + TU

Standard written method

$$\begin{array}{r} \text{e.g.} \quad 435 \\ + \quad 24 \\ \hline 459 \end{array}$$

MOVE ONTO 4 DIGIT

NUMBERS

Leading to 'carrying' below the line (to include 4 digit numbers)

$$\begin{array}{r} \text{e.g.} \quad 625 \\ +148 \\ \hline 773 \\ \quad 1 \end{array}$$

ESTIMATE AND USE INVERSE OPERATIONS TO CHECK ANSWERS TO A CALCULATION

$$\begin{array}{l} 625+148 =773 \quad 148+625 =773 \\ 773 -148 =625 \quad 773 -625 =148 \end{array}$$

Standard written method  
introducing decomposition

extending to H,T,U.

e.g.

Subtract numbers up to 4 digits using the formal written methods of subtraction

START WITH TWO NUMBERS WITH DECOMPOSITION AND EXTEND TO 3-4 NUMBERS

ESTIMATE AND USE INVERSE OPERATIONS TO CHECK ANSWERS TO A CALCULATION

$$\begin{array}{r} 4 \ 53 \ 4 \ 18 \\ -1 \ 1 \ 2 \ 9 \\ \hline 3 \ 4 \ 1 \ 9 \end{array}$$

In decomposition use the word 'exchange' NOT borrow.

Extend to decimals in context of money.

e.g.

\*know that decimal point must be in line

$$\begin{array}{r} \pounds 8.98 \\ - \pounds 4.35 \\ \hline \pounds 4.63 \end{array}$$

Teach formal methods to complete TU X U- extend to HTU X U

e.g.

$$\begin{array}{r} 23 \quad 123 \\ \times 3 \quad \times 3 \\ \hline 69 \quad 369 \end{array}$$

Extend to standard short multiplication with carrying

$$\begin{array}{r} \text{e.g.} \quad 23 \quad 346 \\ \times 8 \quad \times 9 \\ \hline 184 \quad 3114 \\ \quad 2 \quad \quad 45 \end{array}$$

Pupils solve two step problems in contexts, choosing the appropriate operation, working with increasing harder numbers. This should include correspondence questions such as the number of choices of a meal on a menu, or 3 cakes shared equally between 10 children

Find the effect of dividing a one/two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths

Extend to use of decimals in context, for example money.

e.g.

\*know that decimal point must be in line

$$\begin{array}{r} \text{£}4.21 \\ +\text{£}3.87 \\ \hline \text{£}8.08 \\ \hline 1 \end{array}$$

SOLVE ADDITION TWO STEP PROBLEMS IN CONTEXTS DECIDING WHICH OPERATIONS AND METHODS TO USE AND WHY.

Add fractions with the same denominator within one whole

$$\frac{3}{5} + \frac{1}{5} + \frac{4}{5} = \frac{8}{5}$$

$$= 1 \frac{3}{5}$$

Be confident with fractions that add to one and fraction complements to one

e.g.  $\frac{2}{3} + ? = 1$

*Solve simple and money problems involving fractions and decimals to two decimal places*

Subtract fractions with the same denominator within one whole

$$\frac{8}{13} - \frac{3}{13} = \frac{5}{13}$$

Use fractions that add to 1 to find fraction complements to 1

e.g.  $1 - \frac{2}{3} = \frac{1}{3}$

Count up and down in hundredths- recognise that hundredths arise when dividing an object by one hundred and dividing tenths by 10

## YEAR 5 - CALCULATION POLICY 2017

1) Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. 2) Solve problems involving number up to 3 decimal places 3) Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit 4) Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10000 and 100000 5) Recognise and use square numbers and cube numbers and the notation for both 6) Establish whether a number up to 100 is prime and recall all prime numbers up to 19 7) Pupils use and explain the equals sign to indicate equivalence, including missing number problems e.g.  $13 + 24 = 12 + 25$ ;  $33 = 5 \times \square + 8$  8) Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 9) Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy 10) Interpret negative numbers in context 11) Read Roman numerals to 1000(m) and recognise years

Addition	Subtraction	Multiplication	Division
<p>Be able to <b>complete number sentences</b> where a missing number is shown by a symbol. E.g. <math>154 + \underline{\quad} = 200</math>  <math>\underline{\quad} + 14 = 100</math>  <math>10 + \underline{\quad} + 50 = 500</math>  <math>\underline{\quad} + \underline{\quad} + \underline{\quad} = 1000</math>  <math>347 + \underline{\quad} = 1047</math></p> <p>Add the <b>nearest multiple of 10 or 100</b> and then adjust e.g. <math>458 + 79</math> is the same as <math>458 + 80 - 1</math> Standard written method as in Year 4 extending to Th, H, T, U. Include multiple 'carrying'. e.g.</p> $\begin{array}{r} 7648 \\ +1486 \\ \hline 9134 \\ 111 \end{array}$	<p>Record mental subtractions using - and = Be able to complete missing number sentences: e.g. <math>1000 - 170 = \underline{\quad}</math>  <math>\underline{\quad} - 150 = 500</math>  <math>\underline{\quad} - \underline{\quad} = 200</math>  <math>1000 - \underline{\quad} - \underline{\quad} = 190</math></p> <p>Find a small difference by counting up: e.g. <math>8006 - 2993 = 5013</math></p> <p>Subtract mentally a near multiple of 10 / 100 by taking away multiple of 10 / 100 and adjusting by 1 E.g. <math>781 - 199</math> is the same as <math>781 - 200 + 1</math></p>	<p>Identify the doubles of two-digit numbers, use these to calculate mentally doubles of multiples of 10 and 100 and derive the corresponding halves.</p> <p>Derive and recall multiplication facts up to <math>12 \times 12</math> and the related division facts.</p> <p>Extend to standard short multiplication with carrying</p> <p>e.g.</p> $\begin{array}{r} 23 \\ \times 8 \\ \hline 184 \\ 2 \end{array} \qquad \begin{array}{r} 346 \\ \times 9 \\ \hline 3114 \\ 45 \end{array}$	<p>Multiply and divide by powers of 10, 100 and 1000. Divide by powers of 100 when converting units such as Kilometres and metres</p> <p>Children will use the standard short written method of division: Include HTU <math>\div</math> U</p> <p>e.g. <math>196 \div 6 = 32 \text{ r } 4</math></p> $\begin{array}{r} 32 \text{ r } 4 \\ 6 \overline{)196} \end{array}$

Solve addition multi- step problems in contexts, deciding which operations and methods to use and why

Use decimals in context, for example money / measurements.

e.g.

\*know that decimal point must be in line

$$\begin{array}{r} \text{£}4.21 \\ +\text{£}3.87 \\ \hline \text{£}8.08 \\ \hline 1 \end{array}$$

Add fractions with the same denominator beyond one whole

$$\frac{5}{13} + \frac{9}{13} = \frac{14}{13}$$

$$= 1 \frac{1}{13}$$

Begin to add related fractions using equivalences

$$\text{e.g. } \frac{1}{2} + \frac{1}{6} = \frac{3}{6} + \frac{1}{6}$$

In standard written column method use the word 'exchange' NOT borrow.

Use the standard written column method up to numbers with 4 digits including decimals:

$$\begin{array}{r} \text{£}8.8915 \\ - \text{£}4.38 \\ \hline \text{£}4.57 \end{array}$$

Practice calculations with increasingly large numbers to aid fluency( include numbers with multiple zeros)  
e.g 4000-326

Begin to subtract related fractions using equivalences

$$\text{e.g. } \frac{1}{2} - \frac{1}{6} = \frac{2}{6}$$

\*To include decimals with one decimal point e.g.  $12.5 \times 2$  (refer to expanded method first if necessary - leading to short method with carrying)

Extend to long multiplication- multiply numbers up to 4 digits by a one or two digit number using a formal written method, including long multiplication for two digit numbers

$$\begin{array}{r} \text{e.g. } 352 \\ \times 27 \\ \hline 2464 \quad (352 \times 7) \\ \phantom{2464} 7040 \quad (352 \times 20) \\ \hline 9504 \end{array}$$

Understand the terms factor, multiple and Prime , square and cube numbers and use them to construct equivalent statements ( for example  $4 \times 35 = 2 \times 2 \times 35$ ;  
 $3 \times 270 = 3 \times 3 \times 9 \times 19 = 9^2 \times 10$

*Begin to multiply fractions and mixed numbers by whole numbers less than 10*

$$\text{e.g. } 4 \times \frac{2}{3} = \frac{8}{3} = 2 \frac{2}{3}$$

*Extend to division of a 4 digit number by a one digit number and interpret remainders appropriately for the context e.g*

$$196 \div 6 = 32 \frac{4}{6} \text{ or } 32 \frac{2}{3}$$

*Or 32.67*

Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding

$$\text{e.g. } 98 \div 4 = \frac{98}{4} = 24\text{r}2$$

$$24\text{r}2 = 24 \frac{1}{2} = 24.5$$

*Extend further to decimals e.g.  $14.2 \div 3$*

## YEAR 6 - CALCULATION POLICY 2017

1) Perform mental calculations, including with mixed operations and large numbers 2) Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why 3) Pupils explore the order of operations using brackets e.g  $2 + 1 \times 3 = 5$  and  $(2+1) \times 3 = 9$  4) Pupils multiply and divide numbers with up to two decimal places by one digit and two digit numbers. Pupils multiply decimals by whole numbers starting with the simplest cases such as  $0.4 \times 2 = 0.8$  and in practical contexts such as measures and money 5) Solve problems involving conversion of units of measure using decimal notation up to three decimal places 6) Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit

Addition	Subtraction	Multiplication	Division
<p>Be able to <b>complete number sentences</b> where a missing number is shown by a symbol. E.g <math>54 + \underline{\quad} = 200</math>  <math>\underline{\quad} + 1.4 = 10</math>  <math>10 + \underline{\quad} + 50 = 250</math>  <math>\underline{\quad} + \underline{\quad} + \underline{\quad} = 1000</math>  <math>34.7 + \underline{\quad} = 40</math></p> <p>Add the <b>nearest multiple of 10 or 100 or 1000</b> and then adjust e.g. <math>458 + 79</math> is the same as <math>458 + 80 - 1</math>. Extend to adding <math>0.9 / 1.9 / 2.9</math> etc.</p>	<p>Record mental subtractions using - and = Be able to complete missing number sentences: e.g. <math>1000 - 170 = \underline{\quad}</math>  <math>\underline{\quad} - 150 = 500</math>  <math>\underline{\quad} - \underline{\quad} = 200</math>  <math>1000 - \underline{\quad} - \underline{\quad} = 190</math></p> <p>Find a difference by counting up: e.g. <math>0.5 - 0.31 = 0.19</math></p> <p>Subtract mentally a near multiple of 10 / 100 by taking away multiple of 10 / 100 and adjusting by 1 E.g. <math>781 - 199</math> is the same as <math>781 - 200 + 1</math></p>	<p>Identify the doubles of two-digit numbers, use these to calculate mentally doubles of multiples of 10 and 100 and derive the corresponding halves.</p> <p>Multiply one-digit numbers with up to two decimal places by whole numbers e.g</p> $\begin{array}{r} 3.46 \\ \times 9 \\ \hline 31.14 \\ 45 \end{array}$ <p>Estimate 1<sup>st</sup> by multiplying whole numbers 1<sup>st</sup> e.g <math>3 \times 9 = 27</math></p> <p><i>Extending to multiplying a one digit number up to two decimal places by a two digit number</i> e.g <math>3.46 \times 15</math> Estimate 1<sup>st</sup> by multiplying whole numbers 1<sup>st</sup> e.g <math>3 \times 15 = 45</math></p>	<p>Extend to dividing numbers up to 4 digits by a two digit whole number</p> <p>Use written division methods in cases where the answer has up to two decimal places e.g. <math>1.92 \div 6 = 32</math></p> $\begin{array}{r} 0.32 \\ 6 \overline{) 1.1912} \end{array}$ <p>Check by using Inverse e.g <math>0.32 \times 6 = 1.92</math></p>



Standard written method as in Year 5 extending to numbers with any number of digits.  
Extend decimals to numbers with one or two decimal places.

e.g. \*know that decimal point must be in line

$$\begin{array}{r} 124.9 \\ + 7.25 \\ \hline 132.15 \\ 11 \end{array}$$

Add and subtract fractions with different denominators and mixed numbers using the concept of equivalent fractions

$$2\frac{1}{3} + 1\frac{2}{3}$$

$$\frac{7}{3} + \frac{5}{3} = \frac{12}{3} = 4$$

**Standard written method** as in Year 5 extending to numbers with any number of digits.  
Extend to decimals with one or two decimal places.

In standard written column method use the word 'exchange' NOT borrow.

$$\begin{array}{r} 31214.8910 \\ - 7.25 \\ \hline 3117.65 \end{array}$$

← known that extra 0's may need to fill in spaces  
\*know that decimal point must be in line

Add and subtract fractions with different denominators and mixed numbers using the concept of equivalent fractions

$$2\frac{1}{3} - 1\frac{2}{3}$$

$$\frac{7}{3} - \frac{5}{3} = \frac{2}{3}$$

Extend Year 5 to standard short and long multiplication  
Long multiplication initially with explanation.

$$\begin{array}{r} \text{e.g. } 352 \\ \times 27 \\ \hline 2464 \quad (352 \times 7) \\ 7040 \quad (352 \times 20) \\ \hline 9504 \end{array}$$

*Extend to multiplying a 4 digit number by a 2 digit number*

Multiple simple pairs of fractions, writing the answer in the simplest form

$$\text{e.g. } \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$$

Extend to standard long division  
e.g.  $972 \div 36 = 27$

$$\begin{array}{r} 27 \\ 36 \overline{) 972} \\ \underline{720} \quad (20 \times 36) \\ 252 \\ \underline{252} \quad (7 \times 36) \\ 0 \end{array}$$

Extend to dividing numbers up to 4 digits by a two digit whole number

Some children may be able to carry out HTU ÷ TU as short division.

$$11 \overline{) 495} \begin{array}{l} 45 \\ r1 \end{array}$$

Express remainder as a whole number, fraction, decimal or by rounding

$$\begin{array}{l} \text{e.g. } 9 \div 4 = 2 \text{ r } 1 \\ \text{or } 2.25 \\ \text{or } 2\frac{1}{4} \end{array}$$

Divide proper fractions by whole numbers

$$\text{e.g. } \frac{1}{3} \div 2 = \frac{1}{6}$$

## Key Areas to be kept consistent throughout the school:

1. When solving a word problem - use **RUCSAC** mnemonic to aid children's approach:

**R** = Read the question

**U** = Understand what the question is asking you

**C** = Choose which operation you will need to use (+ - x ÷ )

**S** = Solve it!

**A** = Answer the question

**C** = Check your answer!

2. When solving calculations, encourage children to *approximate* first.

3. From Yr 2 onwards, ensure children understand the **INVERSE** methods of calculation e.g. addition / subtraction and multiplication / division

4. When using **NUMBER LINES**:

Adding = jump forwards above the line

Subtracting = jump backwards below the line

5. **Introduce and vary the language** used for the four basic calculation operations:

**ADDITION**: add, sum of, total, count on, increase by, plus, altogether

**SUBTRACTION**: take away, subtract, less than, minus, find the difference

**MULTIPLICATION**: multiply, times, lots of / groups of, product

**DIVISION**: divide by, share, groups of, quotient

