Beecroft Primary School – Calculation And Arithmetic Policy – September 2024

Introduction

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 yearly blocks under the following headings: addition, subtraction, multiplication and division.

Statements taken directly from the programmes of study are listed at the beginning of each section.

A separate maths policy outlines the Beecroft approach to teaching mathematics, including the structure of the lesson, planning, intervention and homework. A list of vocabulary to be developed and the key number facts that children will need to know is also provided for each year group.

Aims Of The Policy

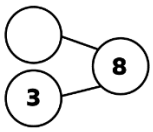
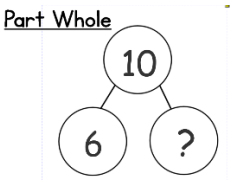
- To ensure consistency and progression in our approach to calculation
- To ensure that children develop an efficient, reliable, formal written method of calculation for all operations
- To ensure that children can use these methods accurately with confidence and understanding

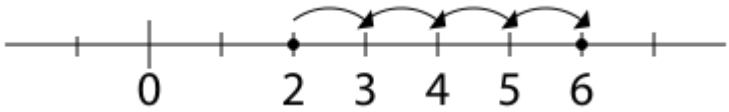
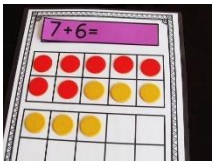
How To Use This Policy

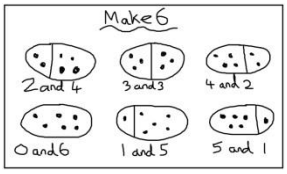
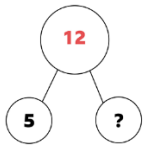
- Use the policy as the basis of your planning but ensure you use previous or following years' guidance to allow for personalised learning
- Always assess your pupils carefully to identify suitable next steps in calculation for groups of children
- If, at any time, children are making significant errors, return to the previous stage in calculation
- Cross reference with the National Curriculum for Mathematics (2014), medium term plans and vocabulary and fact lists.
- Always use suitable resources, models and images to support children's understanding of calculation and place value, as appropriate

- Encourage children to make sensible choices about the methods they use when solving problems
- Repetition is essential and cannot be over stated.

Beecroft Primary School – Calculation And Arithmetic Policy

Year 1	**General**	Children in Year 1 need to be given a solid foundation in the basic building blocks of mental and written arithmetic. Through being taught place value, they will develop an understanding of how numbers work, so that they are confident in 2-digit numbers and beginning to read and say numbers above 100. Pupils need to develop mental fluency with whole numbers and counting. This should involve working with numerals, words and the four operations, including with practical resources including, concrete objects and measuring tools.
	Operation	
	Addition	**<u>Mental calculations</u>** • Read, write and interpret mathematical statements using symbols +, - , = • Represent and use number bonds and related addition facts within 20 • Add one digit and two digit numbers up to 20, including zero. • Solve one step problems using concrete objects and pictorial representations, and missing number problems such as 7 = ? -9 • Use whole part models to represent number sentences.   Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. **<u>Written calculations</u>** • Begin to compare (what's the same/different?) for commutative sums e.g. 3 +7 = 7 + 3 • Memorise and reason with number bonds to 10 & 20 • Add using objects, Numicon, cubes etc. and number lines and tracks • Check with everyday objects • Ensure pre calculation steps are understood, including:

		Counting objects (including solving simple concrete problems) Recognise place value in numbers beyond 20 Counting as reciting and as enumerating Children will continue to practise counting on from any number e.g. 'Put five in your head and count on four.' Initially use a number track to count on for addition, counting on from the largest number: 5 + 4 = 9  'Put your finger on number five. Count on (count forwards) four.' Then progress to a marked number line:  2 + 4 = 6 'Put your finger on number 2 and count on 4.' 8 + 7 = 15 'Put your finger on number eight and count on seven.' 8 9 10 11 12 13 14 15 Ensure children are confident with using a marked number line before moving on to an empty number line (see year two guidance). Continue to practise counting on from the largest number for addition with totals within 20. Children to use tens frames to represent addition calculations.  Children use the hundred square to count on in ones, twos, fives and tens.

		They develop ways of recording calculations using pictures where appropriate, etc.  Pupils record formally using square exercise books.
	Example questions from KS1 test paper.	5 + 7 = 15 + 3 + 3 =
	Subtraction	**<u>Mental calculations</u>** • Subtract one digit and two digit numbers to 20, including zero. • Read, write and interpret mathematical statements using symbols (+, - , =) signs. • Represent and use number bonds and related subtraction facts within 20 • Solve one step problems using concrete objects and pictorial representations, and missing number • Problems such as 7 = 9 - ? • Memorise and reason with number bonds • Subtract using objects, Numicon, cubes etc. and number lines and tracks • Check calculations with everyday objects • Ensure pre calculation steps are understood • Use whole part models to represent number sentences.  Counting on to find a small difference: Introduce complementary addition to find differences (only use for small differences). The use of models is extremely important here to understand the idea of “difference”. Count up from the smallest number to the largest to find the difference using resources, e.g. cubes, beads, number tracks/lines: 11 – 9 = 2. **<u>Written calculations</u>**

- Subtract one digit and two digit numbers to 20, including zero.
- Read, write and interpret mathematical statements involving subtraction (–) and equals (=) signs.
- Represent and use number bonds and related subtraction facts within 20.

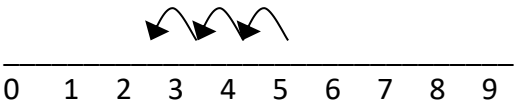
Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Children will continue to practise counting back from a given number.

Initially use a number track to count back for subtraction:

9 – 5 = 4 'Put your finger on number nine. Count back five.'

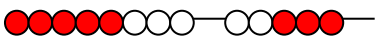
Children then begin to use numbered lines to support their own calculations - using a numbered line to count back in ones.
6 – 3 = 3



The number line should also be used to show that 6 - 3 means the 'difference between 6 and 3' or 'the difference between 3 and 6' and how many jumps they are apart.

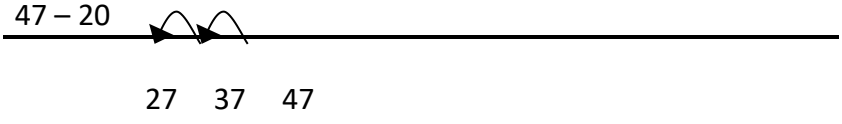
Note: Ensure children are confident with using a marked number line before moving on to an empty number line.

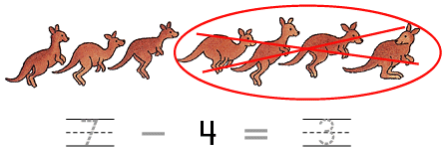
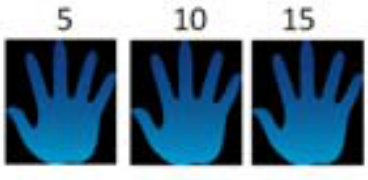
Bead strings or bead bars can be used to illustrate subtraction including bridging through ten by counting back 3 then counting back 2.



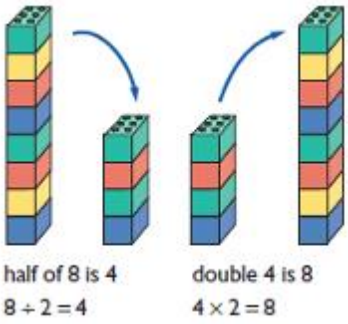
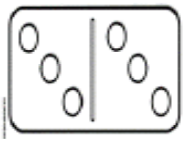
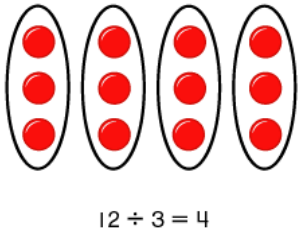
13-5=8

Subtract multiples of 10 on a hundred square and number line
47 – 20



		Children use the hundred square to count back in ones and tens. They develop ways of recording calculations using pictures where appropriate, etc.  Pupils record formally using square exercise books.
	Example questions from KS1 test paper.	19 – 9 = 50 – ? = 20 65 + ? = 93
	Multiplication	**<u>Mental calculations</u>** • Pupils solve one step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. • Count in multiples of twos, fives and tens with equipment, songs & rhythms, and including by rote • Counting in 2s e.g. counting socks, shoes, animal legs... Six pairs of socks. How many socks altogether? 2, 4, 6, 8, 10, 12' • Counting in 5s e.g. counting fingers, fingers in gloves, toes … • Counting in 10s e.g. counting fingers, toes … • Doubles up to 10 • Recognising odd and even numbers • Write as a number pattern (e.g. 5, 10, 15...; 2, 4, 6...; 10, 20, 30...)  **<u>Written calculations</u>** It is helpful to encourage children to begin to write multiplication as a repeated addition sentence in preparation for Year 2. E.g. 2 + 2 + 2 + 2= 8 4 x 2 = 8

		It is important to use a range of models to develop understanding of multiplication, and that children make connections between arrays, number patterns, and counting in twos, fives and tens.  Continue to solve problems in practical contexts and develop the language of early multiplication, with appropriate resources, throughout Y1.
	Example questions from KS1 test paper.	8 x 10 =
	Division	**<u>Mental calculations</u>** • 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. • Pupils make connections between arrays, number patterns, and counting in twos, fives and tens. Songs are useful for counting in steps.  **<u>Written calculations</u>** • Children should experiment with the concepts of sharing and grouping in a number of contexts. Initially they use their own recording—moving towards fluent, symbolic notation in Year 2.

		• Conceptual understanding and recording should be continuously supported by the use of arrays as a default model, as well as other representations, (see below.) "How can we share 6 cakes between 3 people?"   Use dominoes and dice to reinforce concepts of doubling and halving. "Double 3 is 6. Half of 6 is 3."  Children will understand equal groups and share items out in play and problem solving using concrete objects and pictures. They will count in 2s and 10s and later in 5s.  Use arrays to support early division 

		• Pupils will be able to find and name a half and quarter of a shape, object or quantity using concrete objects, pictures and arrays. Continue to solve problems in practical contexts throughout Y1, and develop the language of early division, with appropriate resources.
	Example questions from KS1 test paper.	12 ÷ 2 = ¼ of 20 =

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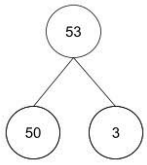
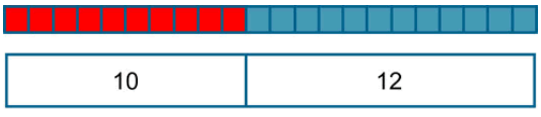
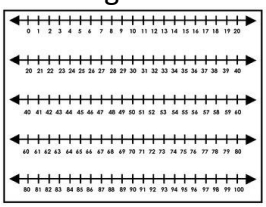
Year 2	**General**	Children in Year 2 need to continue to build on the basic building blocks of mental and written arithmetic. Through being taught place value, they will develop an understanding of how numbers work, so that they are confident in 2 and 3 digit numbers. Pupils need to develop mental fluency with whole numbers and counting. This should involve working with numerals, words, fractions and the four operations, including with practical resources including, concrete objects and measuring tools.
	Operation	
	Addition	**Mental calculations** Add numbers using concrete objects, pictorial representations, and mentally, including: • a two digit number and ones • a two digit number and tens • two two digit numbers • adding three one digit numbers • recall and use addition use related facts up to 100 Use part models for modelling addition.  Use bar models for addition.  10 + 12 = 22 **Written calculations** • Demonstrate the commutative law of addition • Check calculations using inverse and by adding numbers in different order • Begin to record addition in columns to support place value and prepare for formal written methods with larger numbers Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Counting on in ones using an empty number line, within 100…

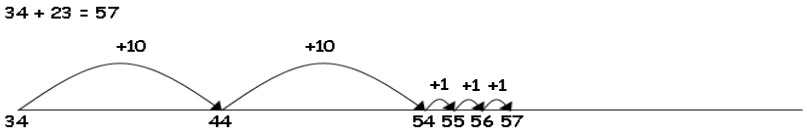


…and in tens
28 + 30 = 58

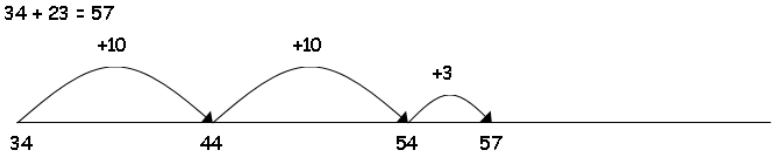
Use in conjunction with a 100 square to show jumps of tens – relate to place value.

Children will begin to use 'empty number lines' themselves starting with the larger number and counting on … 34+23 =

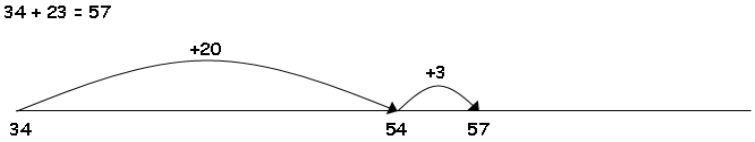
✓ First counting on in tens and ones.



✓ Then helping children to become more efficient by adding the units in one jump (by using the known fact 4 + 3 = 7).



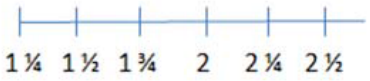
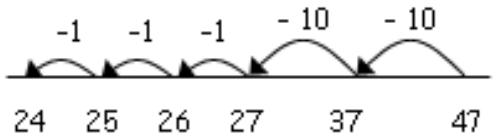
✓ Followed by adding the tens in one jump and the units in one jump.



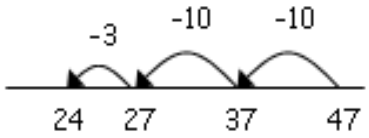
Further develop addition with numbers that bridge 100, using a 200 grid to support.

Children will use partitioning to find the total of numbers including several numbers.

		36 + 42 =
		30 + 40 = 70
		6 + 2 = 8
		70 + 8 = 78
		
		Children will begin to be able to use formal addition to add two and three digit numbers. More able pupils will begin to learn how to carry.
		
		  6 3
		+ 3 2
		  9 5
		
		Use the language of place value to ensure understanding: 'Three add two equals five. Write five in the units column. 60 add 30 equals 90. Write 9 (90) in the tens column.
		
		If children are ready, introduce the formal written method, where it is necessary to 'carry' ten from the units to the tens column:
		
		  6 8
		+ 2 4
		  9 2
		  1
		
		Use the language of place value to ensure understanding: 'Eight add four equals 12. Write two in the units column and 'carry' one (10) across into the tens column. 60 add 20 and the ten that we 'carried' equals 90. Write 9 (90) in the tens column. 92 is the answer. The digit that has been 'carried' should be recorded under the line in the correct column.
		
		Children will use formal addition recognising the place value of numbers up to 100 and then 1000 setting these out appropriately.
		
		Counting in fractions up to 10, starting from any numbers and using the ½ and 2/4 equivalence on the number line.

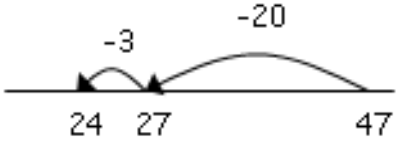
		
	Example questions from KS1 test paper.	5 + 7 = 15 + 3 + 3 =
	Subtraction	**<u>Mental calculations</u>** Subtract numbers using concrete objects, pictorial representations, and mentally, including: • a two digit number and ones • a two digit number and tens • two two digit numbers Use part models and bar models to model subtraction. **<u>Written calculations</u>** Subtract numbers including: • a two digit number and ones • a two digit number and tens • two two digit numbers Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. Children will begin to use empty number lines to support calculations. **Counting back:** First counting back in tens and ones. 47 – 23 = 24  Then helping children to become more efficient by subtracting the units in one jump (by using the known fact 7 – 3 = 4).

47 – 23 = 24



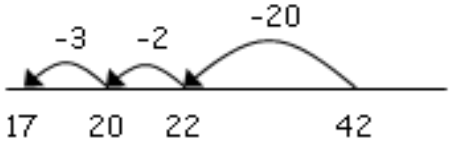
Subtracting the tens in one jump and the units in one jump.

47 – 23 = 24



Bridging through ten can help children become more efficient.

42 – 25 = 17



Further develop subtraction with numbers that bridge 100, using a 200 grid to support.

Note: If, at any time, children are making significant errors, return to the previous stage in calculation.

Number lines will be used when appropriate especially for change with money.

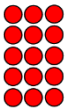
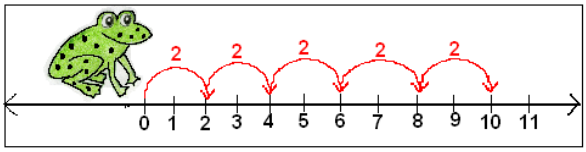
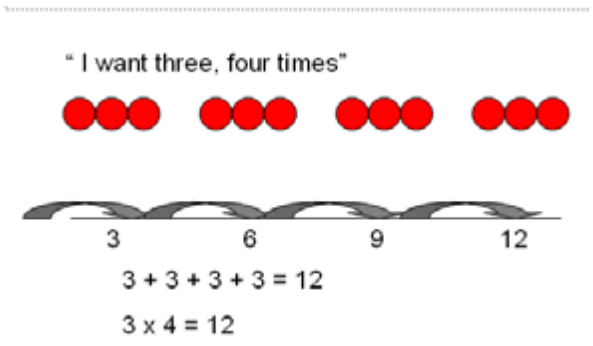
Children will use the hundred square to subtract multiples of tens and ones.

Children will use partitioning to subtract tens and units numbers.

87 – 45 =
87 – 40 = 47
47 – 5 = 42

Children will begin to be able to use formal subtraction to subtract two and three digit numbers. They will know the place value of these numbers and be able to set them out appropriately including with mixed number of digits.

		7 8 -2 3 5 5 Use the language of place value to ensure understanding: 'Eight subtract three, seventy subtract twenty.' When children are confident begin to 'borrow' when the largest number has a smaller value digit of the same place value. Use decomposition method. $\begin{array}{r} {}^{3}\not{4}\,{}^{1}7 \\ -\,2\,9 \\ \hline 1\,8 \end{array}$ Use the language of place value to ensure understanding. 'We can't subtract nine from seven, so we need to exchange a ten for ten ones to give us 30 + 17.'
	Example questions from KS1 test paper.	19 − 9 = 50 − ? = 20 65 + ? = 93
	Multiplication	**<u>Mental calculations</u>** • Recall and use multiplication facts for the 2, 5 and 10 multiplication tables. • Connect the 10x multiplication table to place value. • Recognise odd and even numbers. • Show that multiplication of two numbers can be done in any order (commutative). • Use a variety of language to describe multiplication. • Apply doubling of numbers up to ten to doubling larger numbers. **<u>Written calculations</u>** • Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs. • Begin to use other multiplication tables and recall facts to perform written calculations. • Use a range of materials and contexts … including arrays and repeated addition.

		Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. Combining Groups (repeated addition):  '5 groups of 3' '5 lots of 3' '3 + 3 + 3 + 3 +3 = 15' '5 times 3' '3 multiplied by 5' '5 x 3 = 15' '3 x 5 = 15'  '3 groups of 10 crayons' 'How many crayons altogether?' '10 + 10 + 10 = 30' '3 groups of 10' '3 times ten' '3 x 10 = 30' '10 x 3 = 30' Using an empty number line:  
	Example questions from KS1 test paper.	8 x 10 =
	Division	**<u>Mental calculations</u>**

- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
- Calculate mathematical statements for multiplication and
  division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs.

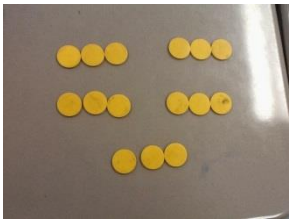
Written calculations

- Show that division of one number by another has to be completed in a specific order – unlike multiplication.
- Solve problems involving division, using materials, arrays, repeated addition, mental methods, and division facts, including problems in contexts. (See below.)

Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

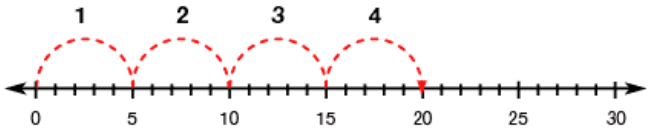
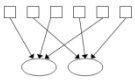
Use arrays to support division.

7 x 2 = 14 14 ÷ 2 = 7

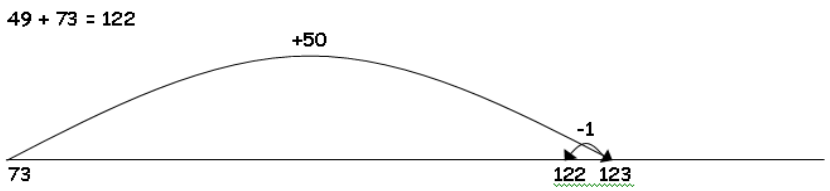


15 ÷ 5 = 3
15 ÷ 3= 5

How many groups of 3?
How many groups of 5?
15 shared between 3 people is…?
15 shared between 5 people is…?

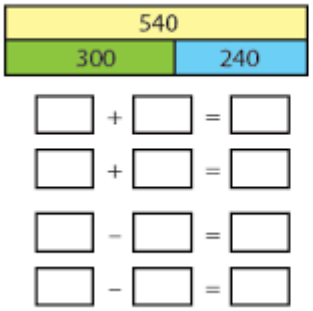
		15 divided by 5 = 3 15 divided by 3 = 5 When children are ready, use an empty number line:  Children will develop their understanding of division and use jottings to support their calculation. <u>Sharing equally</u> 6 sweets shared between 2 people, how many do they each get?  x x x x x x <u>Grouping or repeated subtraction</u> There are 6 sweets, how many people can have 2 sweets each? ○○/○○/○○ <u>Using symbols</u> to stand for unknown numbers to complete equations using inverse operations □ ÷ 2 = 4 20 ÷ △ = 4 □ ÷ △ = 4 • Recognise, find, name and write fractions , ¼, ¾, 2/4 of a length, shape, set of objects or quantity • Write simple fractions for example, ½ of 6 = 3
	Example questions from KS1 test paper.	12 ÷ 2 = ¼ of 20 =

Beecroft Primary School – Calculation And Arithmetic Policy

Year 3	**General**	In lower Key Stage 2, pupils need to build on the concrete and conceptual understandings they have gained in Key Stage 1 and to develop a real mathematical understanding of the four operations. The pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers. Standard written methods for adding larger numbers are taught, learned and consolidated, and written column subtraction is also introduced. Efficient written methods for multiplying or dividing a 2-digit or 3-digit number by a single-digit number are taught.
	Operation	
	Addition	**<u>Mental calculations</u>** • Add numbers mentally including: a three digit number and ones a three digit number and tens a three digit number and hundreds • Partition all numbers and recombine, start with TU + TU then HTU + TU Children will begin to use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies Children will continue to use empty number lines with increasingly large numbers, including compensation where appropriate. Count on from the largest number irrespective of the order of the calculation.  Compensation 

Use bar modelling to re-enforce understanding of addition.

Write the four number facts that this bar model shows.



Written calculations

- Add numbers with up to three digits, using formal written (columnar) methods

Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

If children are ready introduce the formal written method, where it is necessary to 'carry' across the columns and bridge 100:

76 + 47 = 123

```
  4 7
+ 7 6
1 2 3
1 1
```

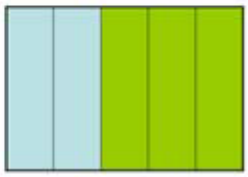
Use the language of place value to ensure understanding: 'Seven add six equals 13. Write three in the units column and 'carry' one (10) across into the tens column. 40 add 70 and the ten that we 'carried' equals 120. Write 2 (20) in the tens column and 'carry' one (100) across into the hundreds column.

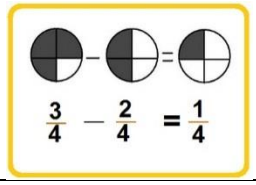
The digits that have been 'carried' should be recorded under the line in the correct column.

If children are confident, further develop with the addition of a three- digit number and a two -digit number:

178 + 43 = 221

```
  1 7 8
+   4 3
  2 2 1
```

		1 1 Note: If, at any time, children are making significant errors, return to the previous stage in calculation. • Addition of fractions with the same denominator within one whole. Addition of fractions with the same denominator $\frac{2}{5} + \frac{3}{5} = \frac{5}{5}$ 
	Example questions from KS2 test paper.	6.1 + 0.3 = 1/9 + 4/9 = 3/4 + 7/8 = 2.5 + 0.05 = 5,756 + 8,643 =
	Subtraction	**<u>Mental calculations</u>** • Subtract numbers mentally, including: a three digit number and ones a three digit number and tens a three digit number and hundreds. Use a number line, dienes, hundred squares, two hundred squares, and similar representations, to support mental calculations. **<u>Written calculations</u>** • Subtract numbers with up to three digits, using formal written methods of columnar subtraction. Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. Children will continue to use empty number lines with increasingly large numbers especially for decimals and money e.g. change from £5.00, £10.00 etc.

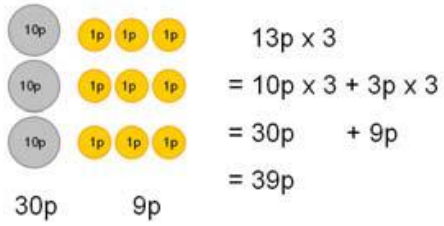
		Formal column subtraction including with borrowing involving numbers up to 1000. Use appropriate vocabulary to explain place value. Eight subtract one equals seven. You cannot subtract fifty from twenty so you need to borrow ten tens (one hundred) from the hundreds column. That leaves six hundred in the hundreds column. You now have twelve tens or one hundred and twenty in the tens column. Now subtract the fifty and you are left with seventy. Six hundred subtract zero leaves six hundred – record the six (600). $\begin{array}{r} {}^{6}\not{7}\not{2}8 \\ -\ 51 \\ \hline 677 \end{array}$ Note: If, at any time, children are making significant errors, return to the previous stage in calculation. • Count up and down in tenths. • Subtract fractions with the same denominator within one whole.  $\frac{8}{12} - \frac{3}{12} = \frac{5}{12}$
	Example questions from KS2 test paper.	12 − 6.01 = 234,897 - 45,996 = 20 − 4 × 2 = 15.4 − 8.88 =
	Multiplication	**<u>Mental calculations</u>** • Recall and use multiplication and division facts for the 3, 4 and 8 multiplication table (and 2, 5 and 10 multiplication tables from Y2) • Use doubling to connect 2, 4 and 8 multiplication tables • Develop efficient mental methods using commutativity • Derive related multiplication and division facts • Calculate mathematical statements for multiplication using the multiplication tables that they know, including for two digit numbers times one digit numbers, using mental methods. <u>Partitioning</u>: multiply the tens first and then

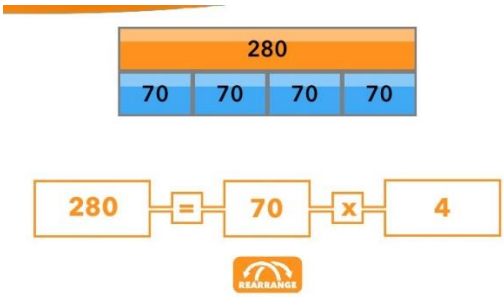
multiply the units, e.g. 57 x 6 = (50 x 6) + (7 x 6) = 300 + 42 = 342

- Include missing number statements. Use symbols to stand for unknown numbers to complete equations using inverse operations

□ x 5 = 20 3 x □ = 18 □ x □ = 32

Ensure opportunities to learn multiplication tables through use of visual models, images and also rote learning.

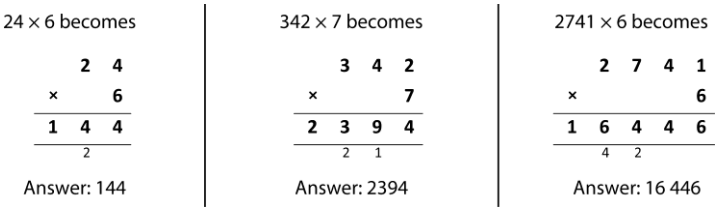




Written calculations

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

Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

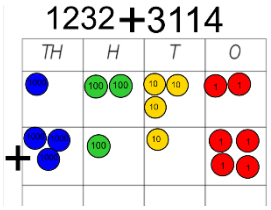
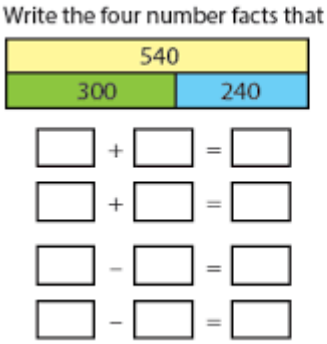


Ensure that the digit 'carried over' is written under the line in the correct column.

		Use the language of place value to ensure understanding. Continue to develop the formal written method of multiplication throughout year three using two-digit numbers multiplied by a one-digit number.
	Example questions from KS2 test paper.	123 × 2 = 5 × 4 × 7 = 1.52 × 6 = 54 x 23 = 17 × 1 ½ =
	Division	**<u>Mental calculations</u>** • Pupils should be taught to recall and use division facts for the 3, 4 and 8 multiplication tables. • Pupils continue to practise their mental recall of multiplication tables... in order to improve fluency. **<u>Written calculations</u>** • Write and calculate mathematical statements for division using the multiplication tables that they know • Two-digit numbers divided by one-digit numbers progressing to formal written division Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. Ensure that the emphasis in Y3 is on grouping rather than sharing. Continue to use practical resources, pictures, diagrams, number lines, arrays and the ÷ sign to record, using multiples that they know, as appropriate (see Y2 guidance). Children should also move onto calculations involving remainders. Use grouping 13 ÷ 4 = 3 r 1 ☺ ☺ ☺ ☺ / ☺ ☺ ☺ ☺ / ☺ ☺ ☺ ☺ / ☺ Using symbols to stand for unknown numbers to complete equations using inverse operations 26 ÷ 2 = ☐ 24 ÷ △ = 12 ☐ ÷ 10 = 8

		Introduce the formal layout using multiplication/division facts that the children know: $2\overline{)68}$ Ensure that the pupils position the answer in the correct position above the line and know what to do if the number being divided includes a zero. E.g. 608 ÷ 2 = 98 ÷ 7 becomes 1 4 7 | 9 (2) 8 Answer: 14 432 ÷ 5 becomes 8 6 r 2 5 | 4 3 (3) 2 Answer: 86 remainder 2 496 ÷ 11 becomes 4 5 r 1 1 1 | 4 9 (5) 6 Answer: $45\frac{1}{11}$ Progress to using the formal method of short division including with remainders 252 ÷ 7 36 7)2542 • Recognise that tenths arise from dividing an object into 10 equal parts and in dividing one digit numbers or quantities by 10. • Recognise, find and write fractions of a discrete set of objects.
	Example questions from KS2 test paper.	7,505 ÷ 5 = 3016 ÷ 13 = 3/4 ÷ 2 =

Beecroft Primary School – Calculation And Arithmetic Policy

Year 4	**General**	In lower Key Stage 2, pupils need to build on their concrete and conceptual understandings and to develop a real mathematical understanding of the four operations. The pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers. Standard written methods for adding larger numbers are taught, learned and consolidated, and written column subtraction is also introduced. Efficient written methods for multiplying or dividing a 2-digit, 3-digit or 4-digit number by a single-digit number are taught.
	Operation	
	Addition	**<u>Mental calculations</u>** • Consolidate partitioning and re-partitioning • Use compensation for adding too much/little and adjusting 55 + 37 = 55 + 30 + 7 = 85 + 7 = 92 Visualise addition using place value models.  Use bar modelling to re-enforce understanding of addition. 

Written calculations

- Add three digit numbers using columnar method and then move onto 4 digits.
- Include decimal addition for money

Children will continue to use the columnar formal method of addition including the following formats below:

- add several numbers with different numbers of digits including different place values and different units of measure;
- begin to add two or more three-digit sums of money, with or without adjustment from pence to pounds;
- know that the decimal points should line up under each other, particularly when adding mixed amounts, e.g. £3.59 + 78p.

Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

If children are confident, introduce the addition of a four-digit number and a three digit number:

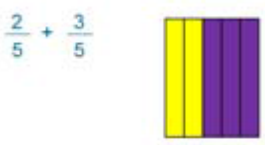
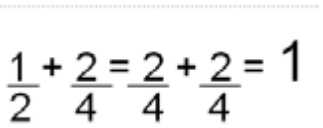
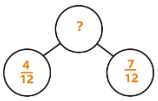
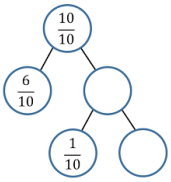
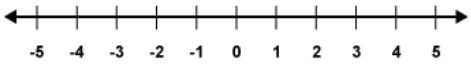
1845 + 526 = 2371

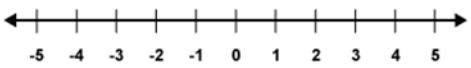
```
  1 8 4 5
+   5 2 6
  2 3 7 1
    1 1
```

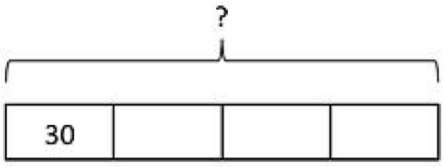
Continue to develop with addition of two four-digit numbers and with decimals (in the context of money or measures).

```
  £12.32
+ £11.81
  £24.13
     1
```

Note: If, at any time, children are making significant errors, return to the previous stage in calculation.

		• Addition of fractions with the same denominator to become fluent through a variety of increasingly complex problems beyond one whole • Counting using simple fractions and decimals, both forwards and backwards   Part model adding and subtracting fractions.   • count through zero to include negative numbers 
	Example questions from KS2 test paper.	6.1 + 0.3 = 1/9 + 4/9 = 3/4 + 7/8 = 2.5 + 0.05 = 5,756 + 8,643 =
	Subtraction	**<u>Mental calculations</u>** • Continue to practise mental methods with increasingly large numbers to aid fluency. Methods to support fluent calculation and encourage efficiency of method: Find a small difference by counting up. E.g. 5003—4996 Subtract nearest multiple of ten and adjust. Partition larger numbers Whenever possible, children should be encouraged to visualise number lines and other basic, supporting representations to promote fluent work without jottings. **<u>Written calculations</u>**

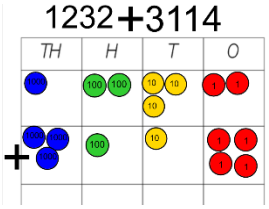
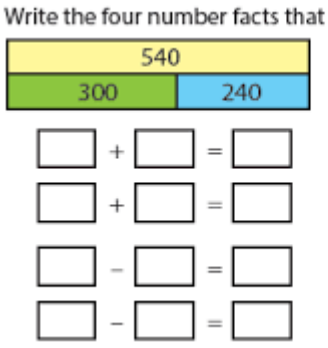
		• Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction. • Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why. • Apply understanding of subtraction with larger integers to that of decimals in context of money and measures. Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. Children will continue to use the columnar formal method of subtraction including the following formats: • subtracting numbers with 4 and 5 digits • be able to subtract numbers with different numbers of digits • using this method, children should also begin to find the difference between two three-digit sums of money, with or without 'adjustment' from pence to pounds; • know that decimal points should line up under each other. • include mixed place values such as 36 – 31.35 Fractions • Count up and down in hundredths. • Subtract fractions with the same denominator. $\frac{8}{12} - \frac{3}{12} = \frac{5}{12}$ • Solve simple measure and money problems involving fractions and decimals to two decimal places. • count backwards through zero to include negative numbers 

	Example questions from KS2 test paper.	**12 − 6.01 =** **234,897 - 45,996 =** **20 − 4 × 2 =** **15.4 − 8.88 =**
	Multiplication	**<u>Mental calculations</u>** • Children will know the multiplication facts for all times tables up to 12 x 12. • Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers • Recognise and use factor pairs and commutativity in mental calculations • Practise mental methods and extend this to three digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6) Use bar modelling to secure understanding of multiplication and division.  30 × 4 = 120 **<u>Written calculation</u>** • Multiply two digit and three digit numbers by a one digit number using formal written layout • Estimate before calculating Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. Introduction of formal long multiplication to those pupils who are ready. Children will approximate first. (see Year 5) • Use factors and multiples to recognise equivalent fractions and simplify where appropriate. $\frac{4}{10}$ $\frac{6}{15}$ $\frac{8}{20}$ $\frac{10}{25}$ $\frac{12}{30}$ $\frac{14}{35}$ $\frac{16}{40}$

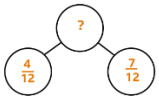
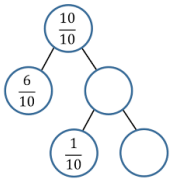
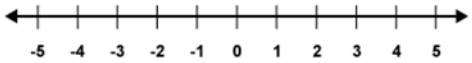
	Example questions from KS2 test paper.	123 × 2 = 5 × 4 × 7 = 1.52 × 6 = 54 x 23 = 17 × 1 ½ =
	Division	**<u>Mental calculations</u>** • Recall multiplication and division facts for multiplication tables up to 12 × 12 **<u>Written calculations</u>** • Divide two-digit and three-digit and four–digit numbers by a one-digit number using formal written layout • These will also include remainders and/or decimals. Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2. Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. Children need to be able to decide what to do after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division. Continue to practise the formal method of short division throughout Y4. • Recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. • Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities. • 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 ones, tenths and hundredths
	Example questions from KS2 test paper.	7,505 ÷ 5 = 3016 ÷ 13 = 3/4 ÷ 2 =

Beecroft Primary School – Calculation And Arithmetic Policy

Year 5	**General**	In upper Key Stage 2 children move on from dealing mainly with whole numbers to performing arithmetic operations with both decimals and fractions.

		They will consolidate their use of written procedures in adding and subtracting whole numbers with up to 6 digits and also decimal numbers with up to two decimal places. Fractions and decimals are also added, subtracted, divided and multiplied, within the bounds of children's understanding of these more complicated numbers. Negative numbers will be added and subtracted.
	Operation	
	Addition	**<u>Informal methods to support mental calculations</u>** • Add numbers mentally with increasingly large numbers, e.g. 12 462 + 2300 = 14 762 • Mentally add tenths, and one digit numbers and tenths • Add decimals, including a mix of whole numbers and decimals, decimals with different numbers of places, and complements of 1 (e.g. 0.83 + 0.17 = 1) Children use representation of choice Refer back to pictorial and physical representations when needed Visualise addition using place value models.  Use bar modelling to re-enforce understanding of addition.  **<u>Written calculations</u>**

		• Add three digit numbers using columnar method and then move onto 4 digits. • Include decimal addition for money Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. $\begin{array}{r} 587 \\ +\ 475 \\ \hline 1062 \\ \hline 1\ 1 \end{array}$ $\qquad$ $\begin{array}{r} 3587 \\ +\ 675 \\ \hline 4262 \\ \hline 1\ 1\ 1 \end{array}$ Continue to use the language of place value to ensure understanding. Ensure that the digits that have been 'carried' are recorded under the line in the correct column. Children should continue to use the column method including the following criteria below: • add numbers with more than 5 digits • add several numbers with different numbers of digits; • begin to add two or more decimal fractions with up to three digits and the same number of decimal places; • be able to add numbers with different amount of decimal places • know that decimal points should line up under each other, particularly when adding mixed amounts, e.g. 3.2 m – 280 cm. £154.75 + £233.82 = £388.57 $\begin{array}{r} 154{\cdot}75 \\ +\ 233{\cdot}82 \\ \hline 388{\cdot}57 \\ \hline 1 \end{array}$ • Add fractions with the same denominator and denominators that are multiples of the same number (to become fluent through a variety of increasingly complex problems and add fractions that exceed 1 as a mixed number).

		$\frac{2}{5}+\frac{2}{5}=\frac{4}{5}$ | $\frac{3}{5}+\frac{2}{5}=\frac{5}{5}$ $\frac{1}{4}+\frac{1}{4}=\frac{2}{4}$ | $\frac{1}{3}+\frac{1}{3}=\frac{2}{3}$ $\frac{4}{7}+\frac{2}{7}=\frac{6}{7}$ | $\frac{2}{4}+\frac{3}{4}=\frac{5}{4}$ $\frac{1}{2}+\frac{1}{4}=?$ Part model adding and subtracting fractions.   • count forwards and backwards with positive and negative whole numbers, including through zero 
	Example questions from KS2 test paper.	6.1 + 0.3 = 1/9 + 4/9 = 3/4 + 7/8 = 2.5 + 0.05 = 5,756 + 8,643 =
	Subtraction	**<u>Mental calculations</u>** • Subtract numbers mentally with increasingly large numbers e.g. 12 462 – 2300 = 10 162 • Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. • Pupils practise subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (for example, 1 – 0.17 = 0.83). • Pupils mentally subtract tenths.

Written calculations

- Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction).
- Pupils practise subtracting decimals.

Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Introduce subtraction of decimals, initially in the context of money and measures.

Children should:

- be able to subtraction numbers with more than 5 digits
- be able to subtract numbers with different numbers of digits
- begin to find the difference between two decimal fractions with up to three digits and the same number of decimal places
- know that decimal points should line up under each other

Fractions

- Subtract fractions with the same denominator and denominators that are multiples of the same number. (Include fractions exceeding 1 as a mixed number.)

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

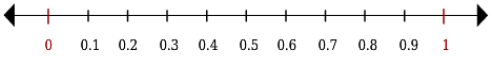
$\frac{13}{10} - \frac{3}{5}$

$3\frac{1}{3} - 1\frac{5}{9}$

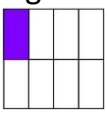
- Solve problems involving number up to three decimal places.

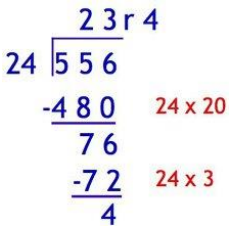
$$\begin{array}{r} 41.2 \\ -\ 3.09 \\ \hline \end{array}$$

- They mentally subtract tenths, and one digit whole numbers and tenths.



		• count backwards with positive and negative whole numbers, including through zero 
	Example questions from KS2 test paper.	**12 – 6.01 =** **234,897 - 45,996 =** **20 – 4 × 2 =** **15.4 – 8.88 =**
	Multiplication	**<u>Mental calculations</u>** • Multiply and divide numbers mentally drawing upon known facts • Multiply and divide whole numbers and those involving decimals by 10, 100 & 1000 • Recognise and use square & cube numbers (& notation) **<u>Written calculations</u>** • 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. • Children will approximate first. Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. 24 × 16 becomes 2 2 4 × 1 6 2 4 0 1 4 4 3 8 4 Answer: 384 124 × 26 becomes 1 2 1 2 4 × 2 6 2 4 8 0 7 4 4 3 2 2 4 1 1 Answer: 3224 124 × 26 becomes 1 2 1 2 4 × 2 6 7 4 4 2 4 8 0 3 2 2 4 1 1 Answer: 3224 Use the language of place value to ensure understanding. When children are confident with long multiplication extend with three-digit numbers multiplied by a two-digit number.

		Using similar methods, they will be able to multiply decimals with one decimal place by a single digit number, approximating first. They should know that the decimal points line up under each other. • Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams • Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths • Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions > 1. ¼ x ½ = Scaling by ½ "finding a half of a quarter" 
	Example questions from KS2 test paper.	**123 × 2 =** **5 × 4 × 7 =** **1.52 × 6 =** **54 x 23 =** **17 × 1 ½ =**
	Division	**<u>Mental calculation</u>** • Divide whole numbers and those involving decimals by 10, 100 and 1000 • Divide numbers mentally drawing upon known facts **<u>Written calculations</u>** • Divide numbers up to 4 digits by a one digit number using the formal written method of short division and interpret remainders appropriately for the context. Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. Continue to practise the formal written method of short division using the language of place value to ensure understanding. Use short formal division HTU ÷ U and decimals for money

		Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2. Children need to be able to decide what to do after division and round up or down accordingly. They will also begin to represent their answers as fractions or decimals. Formal long division with introduced to the more able. Start with chunking method.  • Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number.
	Example questions from KS2 test paper.	**7,505 ÷ 5 =** **3016 ÷ 13 =** **3/4 ÷ 2 =**

Beecroft Primary School – Calculation And Arithmetic Policy

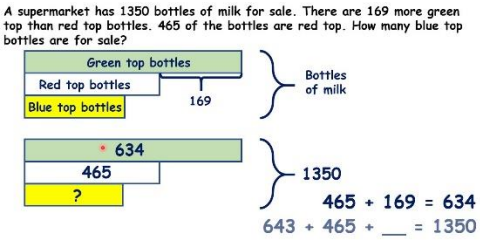
Year 6	**General**	In Year 6 pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.
	Operation	
	Addition	**Mental calculations** • Perform mental calculations, including with mixed operations and large numbers (more complex calculations) • Consolidate partitioning and re partitioning • Use compensation for adding too much/little and adjusting Children use representation of choice

Refer back to pictorial and physical representations when needed

Written calculations

- Pupils practise addition of larger numbers, using the formal written methods of columnar addition.

Use bar modelling to explain reasoning as a method of sowing working out.



Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

- Add fractions with different denominators and mixed numbers, using the concept of equivalent fractions. Start with fractions where the denominator of one fraction is a multiple of the other (e.g. ½ + 1/8 = 5/8)

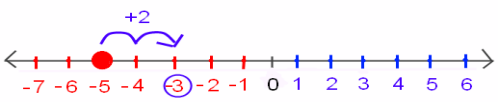
$\frac{4}{5} + \frac{1}{10}$ REWRITE

$\frac{(2)x\ 4}{(2)x\ 5} + \frac{1}{10}$ REWRITE

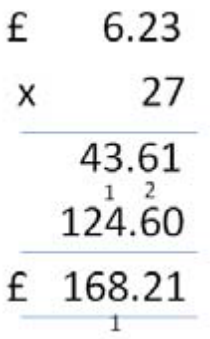
$\frac{8}{10} + \frac{1}{10} = \frac{9}{10}$

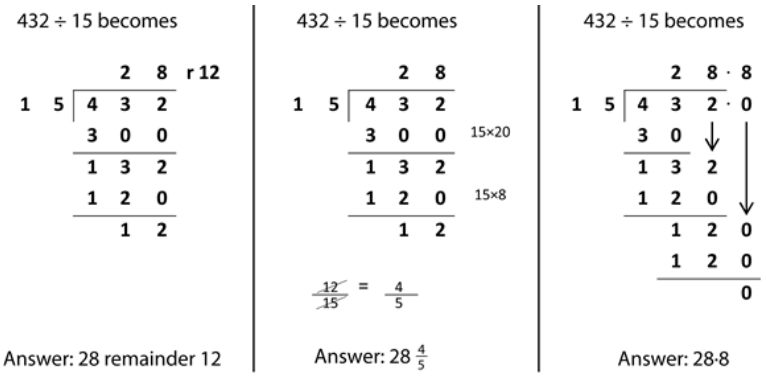
$2\frac{1}{2} + 3\frac{3}{4} =$

- Count forwards and backwards with positive and negative whole numbers, including through zero

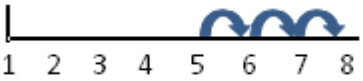
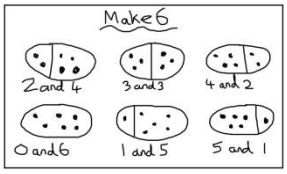


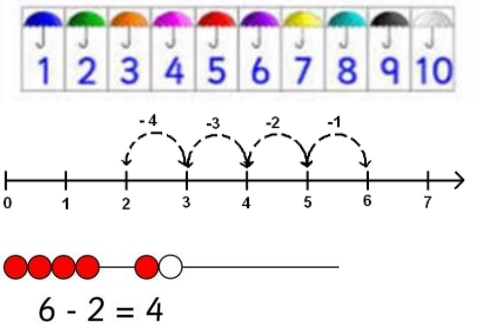
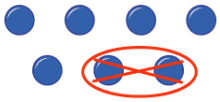
	Example questions from KS2 test paper.	6.1 + 0.3 = 1/9 + 4/9 = 3/4 + 7/8 = 2.5 + 0.05 = 5,756 + 8,643 =
	Subtraction	**<u>Mental calculations</u>** Children: • Perform mental calculations, including with mixed operations and large numbers. • Use estimation to check answers to calculations and determine, in the context of a problem an appropriate degree of accuracy. **<u>Written calculations</u>** • Subtract whole numbers with more than 4 digits, including using formal written methods. • Solve problems involving the calculation and conversions of units of measure, using decimal notation of up to three decimal places where appropriate. Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. Subtract fractions with different denominators and mixed numbers.
	Example questions from KS2 test paper.	12 − 6.01 = 234,897 - 45,996 = 20 − 4 × 2 = 15.4 − 8.88 =
	Multiplication	**<u>Mental calculations</u>** • Perform mental calculations, including with mixed operations and large numbers (increasingly large numbers & more complex calculations) • Use all the multiplication tables to calculate mathematical statements in order to maintain fluency. • Use estimation to check answers to calculations & determine, in the context of a problem, an appropriate degree of accuracy. • Identify the value of each digit in numbers given to three decimal places and multiply

		<u>Written calculations</u> • Children will use the formal long multiplication method to multiply numbers up to 4 digits by a two digit or three digit number. These will include decimals and a mixture of place values to interpret. • Multiply one digit numbers with up to two decimal places by whole numbers. Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.  • Multiply simple pairs of proper fractions, writing the answer in its simplest form e.g. ¼ x½ = 1/8 Key applications of understanding: Recognise that ¼ of 12, ¼ x 12 and 12 divided by 4 are equivalent Use cancellation to simplify the product of a fraction and an integer e.g. 1/5 x 15 = 3
	Example questions from KS2 test paper.	123 × 2 = 5 × 4 × 7 = 1.52 × 6 = 54 x 23 = 17 × 1 ½ =
	Division	**<u>Mental calculations</u>** • Perform mental calculations, including with mixed operations and large numbers. • Identify common factors, common multiples and prime numbers. **<u>Written calculations</u>**

		• Children will use the formal long division method to divide numbers up to 4 digits by a two digit number. These will include decimals and a mixture of place values to interpret. • Children will be able to interpret remainders as whole number remainders, fractions or by rounding as appropriate in context. Note: Ensure that children are confident with the methods outlined in the previous year's guidance before moving on. Continue to practise the formal method of short division, with and without remainders, using the language of place value to ensure understanding. Pupils look at alternative methods of calculation once chunking is consolidated.  • Use common factors to simplify fractions • Divide proper fractions by whole numbers [for example, 1/3 ÷ 2 = 1/6.] • Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375)
	Example questions from KS2 test paper.	7,505 ÷ 5 = 3016 ÷ 13 = 3/4 ÷ 2 =

Beecroft Primary School – Calculation And Arithmetic Policy

EYFS	**General**	
	Operation	
	Addition	Children will engage in a wide variety of songs and rhymes, games and activities. They will begin to relate addition to combining two groups of objects. In practical activities and through discussion they will begin to use the vocabulary involved in addition. *'You have five apples and I have three apples. How many apples altogether?'* They will use a range of concrete and pictorial representations, including real everyday objects, number lines, bead bars...   Teachers demonstrate how to use of the number line. They will find one more than a given number. Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc.  before starting to record formally using horizontal layout 4+2=6 in large square exercise books. Children use the hundred square to count on in ones, twos, fives and tens.
	Example questions from KS1 test paper.	5 + 7 = 15 + 3 + 3 =

	Subtraction	Children will engage in a variety of counting songs and rhymes and practical activities. In practical activities and through discussion they will begin to use the vocabulary associated with subtraction. They will find one less than a given number. They will begin to relate subtraction to 'taking away' using objects to count 'how many are left' after some have been taken away. 6 – 2 = 4 'You have six apples and take two apples away. How many are left?' They will use a range of concrete and pictorial representations, including real everyday objects, number lines, bead bars...  Teachers demonstrate how to use of the number line. Children will begin to count back from a given number. Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures etc.  7 – 2 = 5 before starting to record formally using horizontal layout 7-1=6 in large square exercise books. Children use the hundred square to count back in ones.

	Example questions from KS1 test paper.	19 − 9 = 50 − ? = 20 65 + ? = 93
	Multiplication	Children will engage in a wide variety of songs and rhymes, games and activities. In practical activities and through discussion they will begin to solve problems involving doubling. 'Three apples for you and three apples for me. How many apples altogether?' Children will experience equal groups of objects. They will count in 2s and 10s. They will work on practical problem solving activities involving equal sets or groups.
	Example questions from KS1 test paper.	8 x 10 =
	Division	Children will engage in a wide variety of songs and rhymes, games and activities. In practical activities and through discussion they will begin to solve problems involving halving and sharing. Share the apples between two people. 'Half of the apples for you and half of the apples for me.' Children will understand equal groups and share items out in play and problem solving. 
	Example questions from KS1 test paper.	12 ÷ 2 = ¼ of 20 =