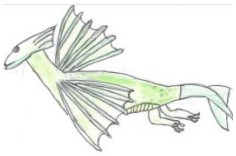
BOREHAM PRIMARY SCHOOL

A Friendship School

'Daring to aim high, scale new heights, spread our wings and fly far'




MATHS CALCULATION POLICY APRIL 2019

How we teach calculations

Staff Consulted: 25.3.19

Approved by Governing Body: 25.3.19

Next Review Date: April 2021

About our Calculation Policy

Rationale and aims

This policy is intended to aid all staff in the understanding of the four rules and to help provide the progression in written methods of calculation. It has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school. Objectives written in green are taken directly from the 2014 National Curriculum. Please note that early learning in number and calculation in Reception follows the Development Matters EYFS document, and this calculation policy is designed to build on progressively from the content and methods established in the Early Years Foundation Stage.

This policy recognises that pupils' mental number knowledge and skills are of prime importance and that they underpin written calculations. It provides a recommended progression through the 4 operations, beginning in Year 1 and carrying on through to Year 6. The progression is set out in stages, recognising that there will often be different ability levels in each class.

This guidance should be used to aid planning and ensure consistency in teaching approaches and expectations throughout the school.

Age stage expectations

The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, **however it is vital that pupils are taught according to the stage that they are currently working at,** being moved onto the next level as soon as they are ready, or working at a lower stage until they are secure enough to move on. Teachers are encouraged to develop the depth and breadth of understanding, as outlined by the 'mastery curriculum' approach.

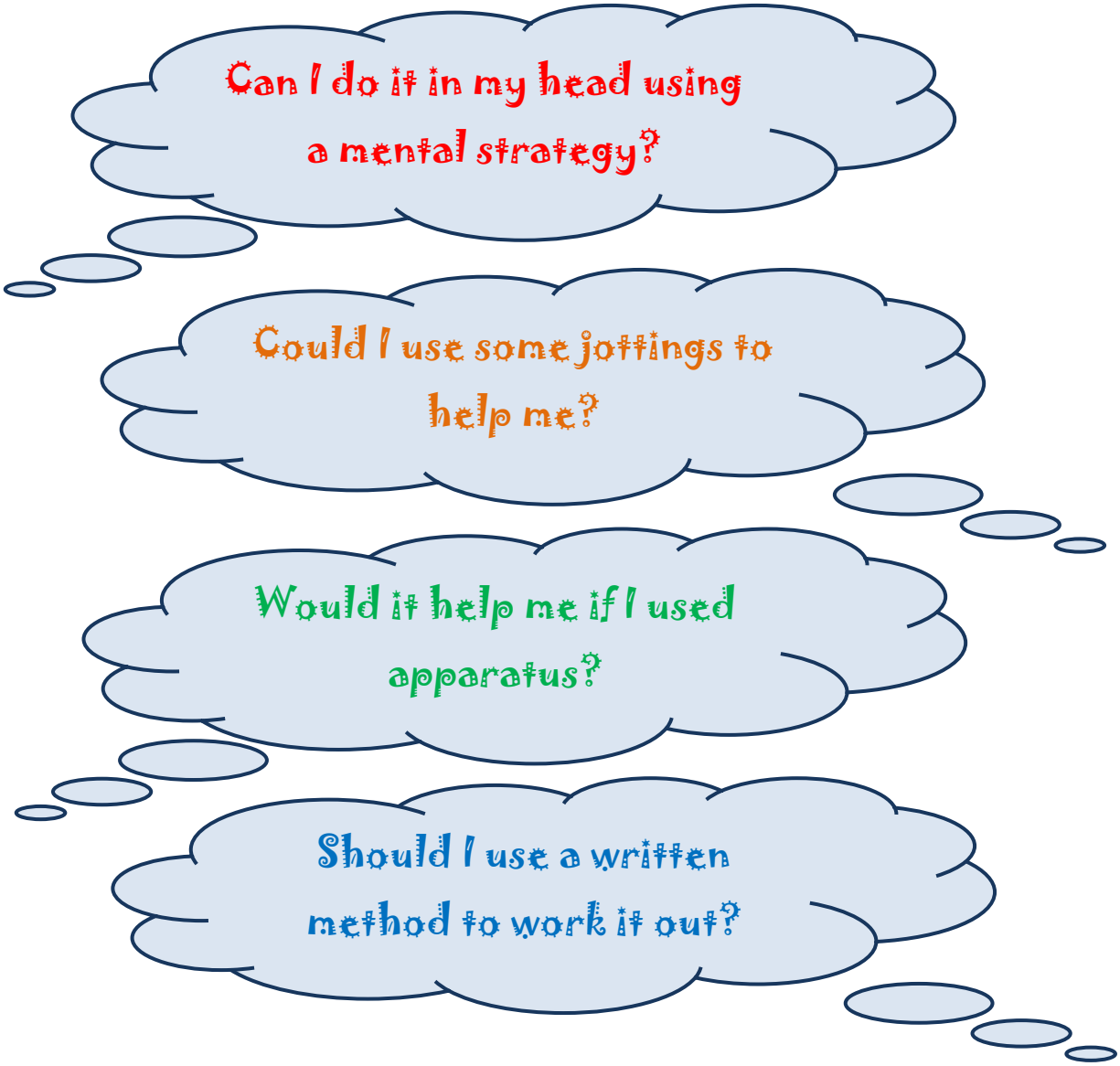
Providing a context for calculation:

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons.

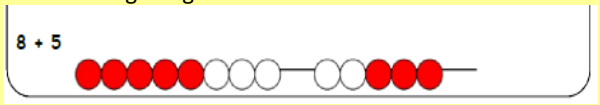
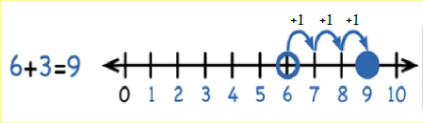
Choosing a calculation method:

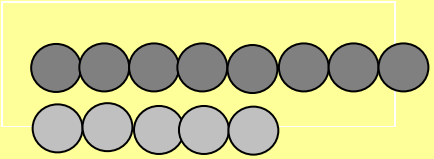
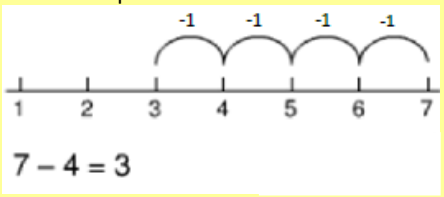
Children need to be taught and encouraged to use the following processes in deciding what approach they will take to a calculation, to ensure they select the most appropriate method for the numbers involved:

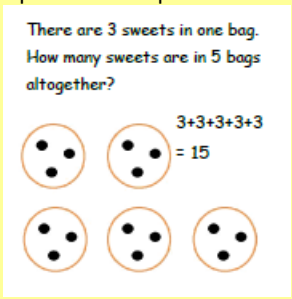
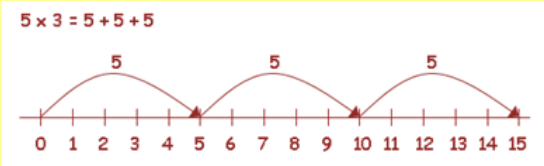
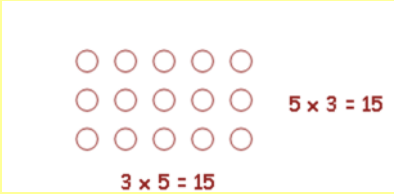
- with a variety of strategies including using the inverse operation.
- Pupils will be given opportunities to apply calculation skills in a range of 'real life' contexts and problem solving scenarios.



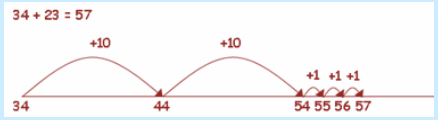
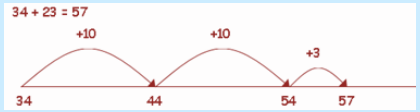
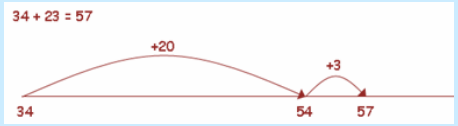
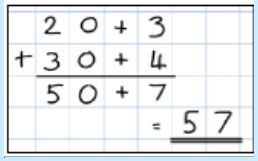
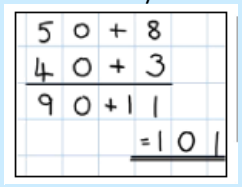
Key Stage 1

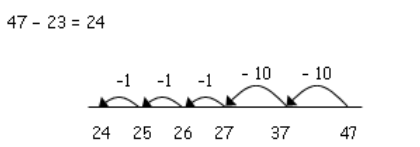
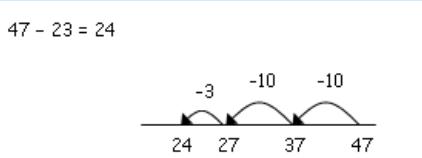
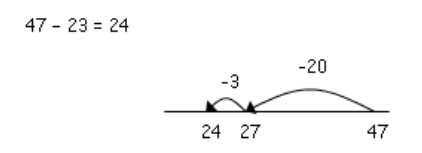
Year		Mental calculation	Written Calculation	Key skills and knowledge
	Overview of KS1	Children in Years 1 and 2 will be given a really solid foundation in the basic building blocks of mental and written arithmetic. Through being taught place value, they will develop an understanding of how numbers work, so that they are confident in 2-digit numbers and beginning to read and say numbers above 100. A focus on number bonds, first via practical hands-on experiences and subsequently using memorisation techniques, enables a good grounding in these crucial facts, and ensures that all children leave Y2 knowing the pairs of numbers which make all the numbers up to 10 at least. They will also have experienced and been taught pairs to 20. Their knowledge of number facts enables them to add several single-digit numbers, and to add/subtract a single digit number to/from a 2-digit number. Another important conceptual tool is their ability to add/subtract 1 or 10, and to understand which digit changes and why. This understanding is extended to enable children to add and subtract multiples of ten to and from any 2-digit number. The most important application of this knowledge is their ability to add or subtract any pair of 2-digit numbers by counting on or back in tens and ones. Children may extend this to adding by partitioning numbers into tens and ones. Children will be taught to count in 2s, 3s, 5s and 10s, and will have related this skill to repeated addition. They will have met and begun to learn the associated 2x, 3x, 5x and 10x tables. Engaging in a practical way with the concept of repeated addition and the use of arrays enables children to develop a preliminary understanding of multiplication, and asking them to consider how many groups of a given number make a total will introduce them to the idea of division. They will also be taught to double and halve numbers, and will thus experience scaling up or down as a further aspect of multiplication and division. Fractions will be introduced as numbers and as operators, specifically in relation to halves, quarters and thirds.		
		Mental calculation	**Written Calculation**	**Key skills and knowledge**
Year 1	***Addition***	Number bonds ('story of' 5, 6, 7, 8, 9 and 10) Count on in ones from a given 2-digit number Add two single-digit numbers  The use of number tracks and lines is helpful for teaching children the order of numbers and for images of addition and subtraction. It may begin with children physically jumping forwards and backwards along a number track. E.g. 5 +3  1 2 3 4 5 6 7 8 9 10 Add three single-digit numbers spotting doubles or pairs to 10 Count on in tens from any given 2-digit number Add 10 to any given 2-digit number Use number facts to add single-digit numbers to two-digit numbers, e.g. use 4 + 3 to work out 24 + 3, 34 + 3… Add by putting the larger number first Use of Numicon to support addition.	Use numbered number lines to add, by counting on in ones. Encourage children to start with the **larger** number and count on.  Number lines will continue up to number 20, where progression to hundred squares will be encouraged. Writing simple number sentences e.g. 3 + 4 = 4 + 2 + 1 = 8 = 5 + 3 _ + _ = _	Counting in ones Counting in tens Count on 1 from any given 2-digit number Read and write numbers to 100 in numerals, incl. 1—20 in words Count to and across 100. Understand that addition can be done in any order. Read, write and interpret mathematical statements involving addition (+) and equals (=) signs Represent and use number bonds and related subtraction facts within 20 Add one-digit and two-digit numbers to 20, including zero Solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems such as 7 = ☐ – 9.

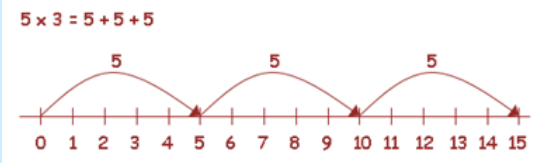
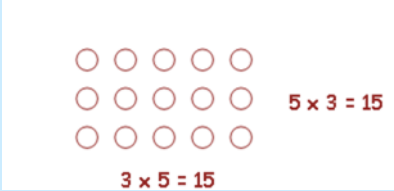
Year		Mental calculation	Written Calculation	Key skills and knowledge
	Subtraction	Children consolidate understanding of subtraction practically, showing subtraction on bead strings, using cubes etc. Number bonds ('story of' 5, 6, 7, 8, 9 and 10) Count back in ones from a given 2-digit number Children need practical activities of taking away - finding how many are left from a collection of objects when some are removed. E.g. There were 8 balloons. One popped. How many balloons are left?  Children also need practical activities around 'finding the difference', which involves making a comparison between the numbers in two groups of objects. They need to recognise that this is another example of subtraction. E.g. How many more biscuits does Sally have than you?  'Sally has 3 more than me'. This can be demonstrated with Numicon. Subtract one single-digit number from another Count back in tens from any given 2-digit number Subtract 10 from any given 2-digit number Use number facts to subtract single-digit numbers from two-digit numbers, e.g. use 7 – 2 to work out 27 – 2, 37 – 2…	Use numbered number lines to subtract, by counting back in ones. Ensure that children know they have to start with the **larger** number and count back with subtraction. Record simple subtraction number sentences. 	Counting back in ones from 20 to 0 Counting back in tens from 100 to 0 Count back 1 from any given 2-digit number Subtraction is the inverse of addition; Subtraction is **not** commutative unlike addition i.e. 3 + 5 = 5 + 3 but 5 – 3 ≠ 3 – 5 Read, write and interpret mathematical statements involving subtraction (–) and equals (=) signs Represent and use number bonds and related subtraction facts within 20 Subtract one-digit and two-digit numbers to 20, including zero Solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ☐ – 9.

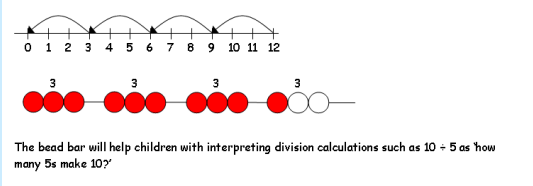
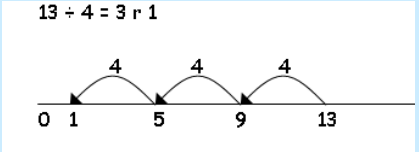
Year		Mental calculation	Written Calculation	Key skills and knowledge
	Multiplication	Children can complete practical activities involving grouping objects. Rhymes and stories can be used that involve counting in different intervals. They should see everyday versions of arrays, e.g. egg boxes, baking trays, ice cube trays, wrapping paper etc and use this in their learning answering questions such as 'How many eggs would we need to fill the egg box? How do you know?' Use apparatus to sort objects into groups. E.g. Sort six compare bears into 2 groups. How many in each group?  2 lots of 3 2 groups of 3 2 x 3 This can be represented with Numicon. A mixture of pictures, words and symbols will be used by children in order to explain to someone else the methods that they have used. Begin to count in 2s, 5s and 10s Begin to say what three 5s are by counting in 5s or what four 2s are by counting in 2s, etc. Double numbers to 10	Begin to write simple number sentences to represent multiplication.  Repeated addition progressing to multiplication. E.g. What is the value of 3 five-pence coins? 5 + 5 + 5 3 groups of 5 5 x 3 Repeated addition can be shown easily on a number line:  Children should be able to model a multiplication calculation using an array. 	Begin to count in 2s and 10s Double numbers to 5 using fingers Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Year		Mental calculation	Written Calculation	Key skills and knowledge
	Division	Children will understand equal groups and share items out in play and problem solving.  Begin to count in 2s, 5s and 10s Find half of even numbers to 12 and know it is hard to halve odd numbers Find half of even numbers by sharing Begin to use visual and concrete arrays or 'sets of' to find how many sets of a small number make a larger number.	The division symbol may be introduced to the children but at this stage, they are more likely to record division through pictorial representations. E.g. How many cars can you make with 4 wheels each if you have eight wheels?  Children should be taught that division can be the same as grouping or repeated subtraction. There are 6 sweets, how many people can have 2 sweets each?  6 sweets 3 children = 2 each	Begin to count in 2s and 10s Find half of even numbers by sharing Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Year		Mental calculation	Written Calculation	Key skills and knowledge
Year 2	***Addition***	Number bonds – knowing all the pairs of numbers which make all the numbers to 12, and pairs with a total of 20 Count on in ones and tens from any given 2-digit number Add two or three single-digit numbers, using the strategies of number bonds, doubles or near doubles. Add a single-digit number to any 2-digit number using number facts, including bridging multiples of 10. (E.g. 45 + 4, 38 + 7) Add 10 and small multiples of 10 to any given 2-digit number, using a hundred square initially. Add any pair of 2-digit numbers. Using a marked number line for addition.	Children will begin to use 'empty number lines' themselves starting with the larger number and counting on, firstly by counting on in tens and ones (to be taught separately, then together).  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.  Children should be guided to move to the partitioned column method once they are secure with tens and units, initially where the total of the units does not cross the boundary of the tens.  When the children can confidently add a 2-digit number to a multiple of ten mentally, they are ready for adding pairs of numbers that do cross the tens boundary. 	Know pairs of numbers which make each total up to 10 Add two single digit numbers Add a single-digit number to a 2-digit number by counting on in ones Add 10 and small multiples of 10 to a 2-digit number by counting on in tens Solve problems with addition: using concrete objects and pictorial representations, including those involving numbers, quantities and measures. Applying their increasing knowledge of mental and written methods Recall and use addition facts to 20 fluently, and derive and use related facts up to 100 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 Show that addition of two numbers can be done in any order (commutative). Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

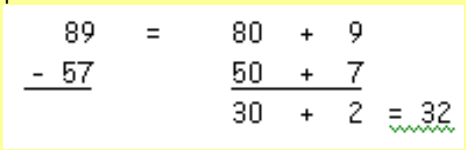
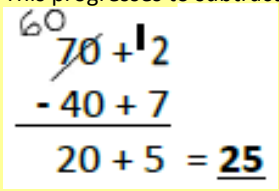
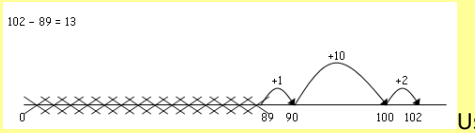
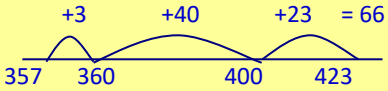
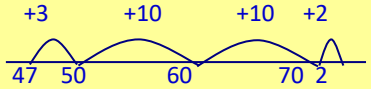
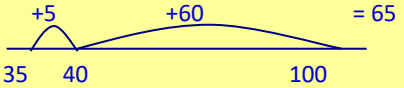
Year		Mental calculation	Written Calculation	Key skills and knowledge
	Subtraction	Number bonds – knowing all the pairs of numbers which make all the numbers to 12 Count back in ones and tens from any given 2-digit number Subtract a single-digit number from any 2-digit number using number facts, including bridging multiples of 10, e.g. 56 – 3, 53 – 5. Subtract 10 and small multiples of 10 from any given 2-digit number Subtract any pair of 2-digit numbers by counting back in tens and ones or by counting up.	Children will begin to use empty number lines to support calculations. First counting back in tens and ones.  Then helping children to become more efficient by subtracting the units in one jump (by using the known fact 7 – 3 = 4).  Subtracting the tens in one jump and the units in one jump.  Children should be guided to move to the partitioned column method once they are secure with tens and units, where no exchanging is required.	Know pairs of numbers which make each total up to 10 Subtract a single-digit number from a 2-digit number by counting back in ones Subtract 10 and small multiples of 10 from a 2-digit number by counting back in tens Solve problems with subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures Applying their increasing knowledge of mental and written methods Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100 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 Show that subtraction of one number from another cannot be done in any order (so is not commutative) Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

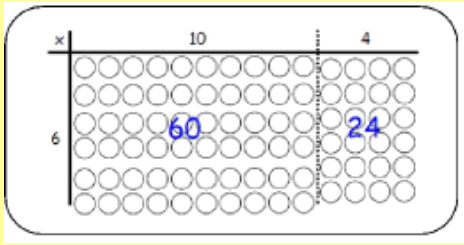
Year		Mental calculation	Written Calculation	Key skills and knowledge
	Multiplication	Count in 2s, 5s and 10s Begin to count in 3s. Begin to understand that multiplication is repeated addition and to use arrays (E.g. 3 x 4 is three rows of 4 dots) Begin to learn the 2x, 3x, 5x and 10x tables, seeing these as 'lots of', e.g. 5 lots of 2, 6 lots of 2, 7 lots of 2, etc. Double numbers up to 20 Begin to double multiples of 5 to 100 Begin to double two-digit numbers less than 50 with 1s digits of 1, 2, 3 4 or 5 Using problem solving to see 'smaller parts' which build to make a 'larger whole' e.g. Find a ribbon that is 4 times as long as the blue ribbon, which is 2cm long.	Repeated addition progressing to multiplication. E.g. What is the value of 3 five-pence coins? 5 + 5 + 5 3 groups of 5 5 x 3 Repeated addition can be shown easily on a number line:  Children should be able to model a multiplication calculation using an array.  Using symbols to stand for unknown numbers to complete equations using inverse operations ☐ x 5 = 20 3 x △ = 18 ☐ x ○ = 10	Count in 2s, 3s, 5s and 10s Begin to use and understand simple arrays, e.g. 2 x 4 is two lots of four buns. Double numbers up to 10 Double multiples of 10 to 50 Recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers Calculate mathematical statements for within the multiplication tables and write them using the multiplication (×) and equals (=) signs Show that multiplication of two numbers can be done in any order (commutative) Solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts.

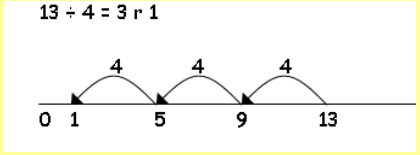
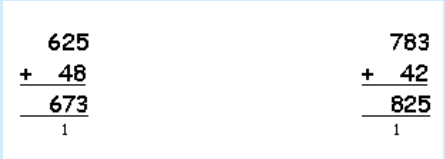
Year		Mental calculation	Written Calculation	Key skills and knowledge
	Division	Count in 2s, 5s and 10s Begin to count in 3s Using fingers, say where a given number is in the 2s, 5s or 10s count. (E.g. 8 is the fourth number when I count in twos.) Relate division to grouping. (E.g. how many groups of five in fifteen?) Halve numbers to 20 Begin to halve numbers to 40 and multiples of 10 to 100 Find ½, $^1/_3$, ¼ and ¾ of a quantity of objects and of amounts (whole number answers)	Repeated subtraction using a number line or bead bar 12 ÷ 3 = 4  The bead bar will help children with interpreting division calculations such as 10 ÷ 5 as 'how many 5s make 10?' Using symbols to stand for unknown numbers to complete equations using inverse operations ☐ ÷ 2 = 4 20 ÷ △ = 4 ☐ ÷ △ = 4 Once secure with the earlier methods, children should now move onto calculations involving remainders. Vocabulary should be moved on from sharing to grouping. E.g. How many groups of 4 in 13? 13 ÷ 4 = 3 r 1 	Count in 2s, 5s and 10s Say how many rows in a given array. (E.g. how many rows of 5 in an array of 3 x 5) Halve numbers to 12 Find ½ of amounts Recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers Calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs Show that division of one number by another is not commutative Solve problems involving division, using materials, arrays, repeated subtraction, mental methods, and division facts, including problems in contexts.

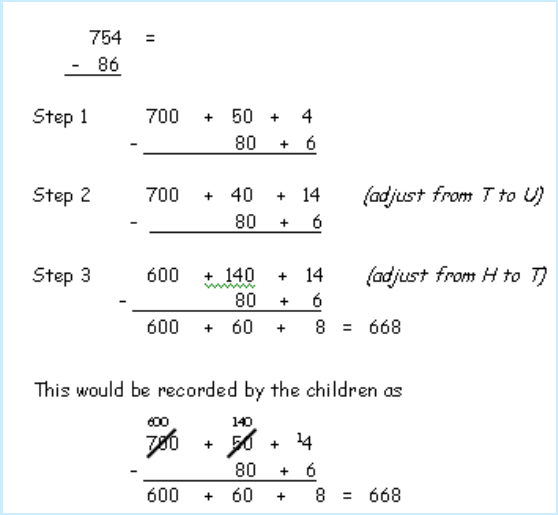
Lower Key Stage 2

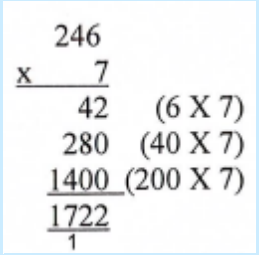
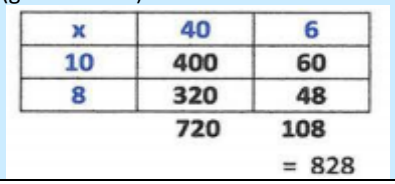
	Overview of LKS2	In the lower juniors, children build on the concrete and conceptual understandings they have gained in the Infants to develop a real mathematical understanding of the four operations, in particular developing arithmetical competence in relation to larger numbers. In addition and subtraction, they are taught to use place value and number facts to add and subtract numbers mentally and will develop a range of strategies to enable them to discard the 'counting in ones' or fingers-based methods of the infants. In particular, they will learn to add and subtract multiples and near multiples of 10, 100 and 1000, and will become fluent in complementary addition as an accurate means of achieving fast and accurate answers to 3-digit subtractions. Standard written methods for adding larger numbers are taught, learned and consolidated, and written column subtraction is also introduced. This key stage is also the period during which all the multiplication and division facts are thoroughly memorised, including all facts up to the 12 x 12 table. Efficient written methods for multiplying or dividing a 2-digit or 3-digit number by as single-digit number are taught, as are mental strategies for multiplication or division with large but friendly numbers, e.g. when dividing by 5 or multiplying by 20. Children will develop their understanding of fractions, learning to reduce a fraction to its simplest form as well as finding non-unit fractions of amounts and quantities. The concept of a decimal number is introduced and children consolidate a firm understanding of one-place decimals, multiplying and dividing whole numbers by 10 and 100.		
Year 3	***Addition***	Know pairs with each total to 20 Know pairs of multiples of 10 with a total of 100 Add any two 2-digit numbers by counting on in 10s and 1s or by using partitioning Add multiples and near multiples of 10 and 100 Perform place value additions without a struggle. (E.g. 300 + 8 + 50 = 358) Use place value and number facts to add a 1-digit or 2-digit number to a 3-digit number. (E.g. 104 + 56 is 160 since 104+50=154 and 6+4=10 and 676 + 8 is 684 since 8=4+4 and 76+4+4=84) Add pairs of 'friendly' 3-digit numbers, e.g. 320 + 450 Begin to add amounts of money using partitioning.	Use expanded column addition to add two or three 3-digit numbers or three 2-digit numbers E.g. 43 + 76 = 40 + 70 = 110 3 + 6 = 9 110 + 9 = 119 Partitioning both numbers into tens and units mirrors the column method where units are placed under units and tens are placed under tens. E.g. 43 + 76 = 43 = 40 + 3 76 = 70 + 6 + 110 + 9 = 119 Begin to use compact column addition to add numbers, being introduced to carrying for the first time. 236 + 73 309 1 Begin to add like fractions. (E.g. $^3/_8 + {}^1/_8 + {}^1/_8$) Recognise fractions that add to 1. (E.g. ¼ + ¾ or $^3/_5 + {}^2/_5$)	Know pairs of numbers which make each total up to 10, and which total 20 Add two 2-digit numbers by counting on in tens and ones (E.g. 56 + 35 is 56 + 30 and then add the 5) Understand simple place value additions: 200 + 40 + 5 = 245 Use place value to add multiples of 10 or 100 Add numbers mentally, including: • a three-digit number and ones • a three-digit number and tens • a three-digit number and hundreds Add numbers with up to three digits, using formal written methods of columnar addition Estimate the answer to a calculation and use inverse operations to check answers Solve problems, including missing number problems, using number facts, place value, and more complex addition.

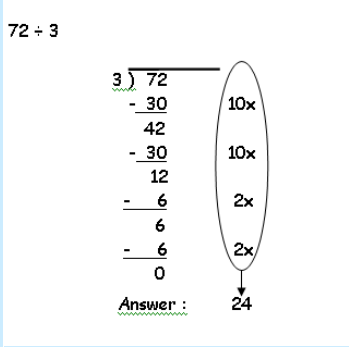
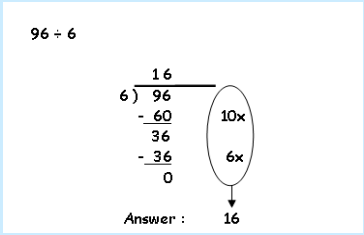
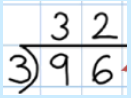
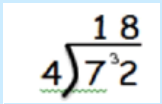
	Subtraction	Know pairs with each total to 20 Subtract any two 2-digit numbers Perform place value subtractions without a struggle. (E.g. 536 – 30 = 506, etc.) Subtract 2-digit numbers from numbers >100 by counting up. (E.g. 143 – 76 is done by starting at 76, add 4 (80) then add 20 (100) then add 43 making the difference a total of 67) Subtract multiples and near multiples of 10 and 100 Subtract, when appropriate, by counting back or taking away, using place value and number facts. Find change from £1, £5 and £10.	Be introduced to columnar subtraction, initially in a partitioned form.  89 = 80 + 9 - 57 = 50 + 7 = 30 + 2 = 32 This progresses to subtraction with an exchange.  60 70 +12 - 40 + 7 20 + 5 = **25** Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used.  Use counting up as an informal written strategy for subtracting pairs of three-digit numbers, e.g. 423 – 357 is  Begin to subtract like fractions. (E.g. $^{7}/_{8}$ - $^{3}/_{8}$)	Know pairs of numbers which make each total up to 10, and which total 20 Count up to subtract 2-digit numbers: 72 – 47 is  Subtract multiples of 5 from 100 by counting up  Subtract multiples of 10 and 100 Subtract numbers mentally, including: • a three-digit number and ones • a three-digit number and tens • a three-digit number and hundreds Subtract numbers with up to three digits, using the formal written methods of columnar subtraction Estimate the answer to a calculation and use inverse operations to check answers Solve problems, including missing number problems, using number facts, place value, and more complex subtraction.

	Multiplication	Know by heart all the multiplication facts in the 2x, 3x, 4x, 5x, 8x and 10x tables Multiply whole numbers by 10 and 100 Recognise that multiplication is commutative Use place value and number facts in mental multiplication. (E.g. 30 x 5 is 15 x 10) Partition teen numbers to multiply by a single-digit number. (E.g. 3 x 14 as 3 x 10 and 3 x 4) Double numbers up to 50	Use partitioning (grid multiplication) to multiply 2-digit and 3-digit numbers by 'friendly' single digit numbers. Initially use an array to represent the problem. 14 x 6  E.g. 23 x 8 × 20 3 8 160 24 160 + 24 184 × 70 2 30 2100 60 8 560 16 2100 + 560 + 60 + 16 2736 1 Please note that the grid method is an interim method.	Know by heart the 2x, 3x, 5x and 10x tables Double given tables facts to get others Double numbers up to 25 and multiples of 5 to 50 Recall and use multiplication facts for the 3, 4 and 8 multiplication tables Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods Solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which *n* objects are connected to *m* objects.

	Division	Know by heart all the division facts derived from the 2x, 3x, 4x, 5x, 8x and 10x tables. Divide whole numbers by 10 or 100 to give whole number answers Recognise that division is not commutative. Use place value and number facts in mental division. (E.g. 84 ÷ 4 is half of 42) Divide larger numbers mentally by subtracting the tenth multiple, including those with remainders. (E.g. 57 ÷ 3 is 10 + 9 as 10x3=30 and 9x3=27) Halve even numbers to 100, halve odd numbers to 20	Grouping on a number line. E.g. How many groups of 4 in 13? 13 ÷ 4 = 3 r 1  Children need to be able to decide what to do with remainders after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division. For example 62 ÷ 8 is 7 remainder 6, but whether the answer should be rounded up to 8 or rounded down to 7 depends on the context. e.g. I have 62p. Sweets are 8p each. How many can I buy? Answer: 7 (the remaining 6p is not enough to buy another sweet) Apples are packed into boxes of 8. There are 62 apples. How many boxes are needed? Answer: 8 (the remaining 6 apples still need to be placed into a box) Find unit fractions of quantities and begin to find non-unit fractions of quantities	Know by heart the division facts derived from the 2x, 3x, 5x and 10x tables Halve even numbers up to 50 and multiples of ten to 100 Perform divisions within the tables including those with remainders, e.g. 38 ÷ 5. Recall and use division facts for the 3, 4 and 8 multiplication tables Write and calculate mathematical statements for division using related multiplication facts, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods Solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which *n* objects are connected to *m* objects.
Year 4	***Addition***	Add any two 2-digit numbers by partitioning or counting on Know by heart/quickly derive number bonds to 100 and to £1 Add to the next hundred, pound and whole number. (E.g. 234 + 66 = 300, 3.4 + 0.6 = 4) Perform place value additions without a struggle. (E.g. 300 + 8 + 50 + 4000 = 4358) Add multiples and near multiples of 10, 100 and 1000. Add £1, 10p, 1p to amounts of money Use place value and number facts to add 1-, 2-, 3-and 4-digit numbers where a mental calculation is appropriate'. (E.g. 4004 + 156 by knowing that 6+4=10 and that 4004+150= 4154 so total is 4160)	Column addition for 3-digit and 4-digit numbers, carrying below the line.  Add like fractions, e.g. $^3/_5 + {}^4/_5 = {}^7/_5 = 1\ {}^2/_5$. Be confident with fractions that add to 1 and fraction complements to 1. (E.g. $^2/_3 + ? = 1$)	Add any 2-digit numbers by partitioning or counting on Number bonds to 20 Know pairs of multiples of 10 with a total of 100 Add friendly larger numbers using knowledge of place value and number facts Use expanded column addition to add 3-digit numbers Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate Estimate and use inverse operations to check answers to a calculation Solve addition (and subtraction) two-step problems in contexts, deciding which operations and methods to use and why.

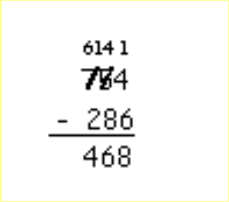
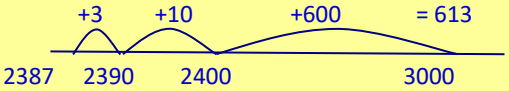
	Subtraction	Subtract any two 2-digit numbers Know by heart/quickly derive number bonds to 100 Perform place value subtractions without a struggle. (E.g. 4736 – 706 = 4030, etc.) Subtract multiples and near multiples of 10, 100 and 100 Subtract by counting up. (E.g. 503 – 368 is done by adding: 368 +2 +30 +100 +3 so we added 135) Subtract, when appropriate, by counting back or taking away, using place value and number facts. Subtract £1, 10p, 1p from amounts of money Find change from £10, £20 and £50.	Use expanded column subtraction for 3-digit and 4-digit numbers  754 = - 86 Step 1 700 + 50 + 4 - 80 + 6 Step 2 700 + 40 + 14 (adjust from T to U) - 80 + 6 Step 3 600 + 140 + 14 (adjust from H to T) - 80 + 6 600 + 60 + 8 = 668 This would be recorded by the children as 600 140 700 + 50 + 14 - 80 + 6 600 + 60 + 8 = 668 Use complementary addition to subtract amounts of money, and for subtractions where the larger number is a near multiple of 1000 or 100 E.g. 2002 – 1865 is +5 +30 +102 = 137 1865 1870 1900 2002 Subtract like fractions, e.g. ¼ + $^1/_8$ = $^3/_8$ Use fractions that add to 1 to find fraction complements to 1, e.g. 1 – $^2/_3$ = $^1/_3$	Use counting up with confidence to solve most subtractions, including finding complements to multiples of 100. (E.g. 512 – 287 is done by +3 +10 +100 +100 +12 = 225 287 290 300 400 500 512 67 + ? = 100 +3 +30 = 33 67 70 100 Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate Estimate and use inverse operations to check answers to a calculation Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

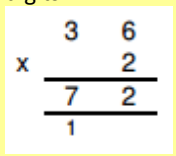
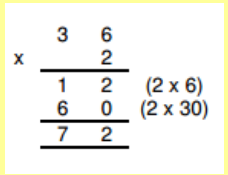
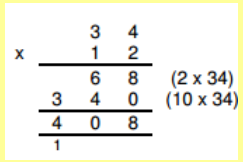
	Multiplication	Know by heart all the multiplication facts up to 12 x 12. Recognise factors up to 12 of two-digit numbers. Multiply whole numbers and one-place decimals by 10, 100, 1000 Multiply multiples of 10, 100, 1000 by single digit numbers. (E.g. 300 x 6 or 4000 x 8) Use understanding of place value and number facts in mental multiplication. (E.g. 36 x 5 is half of 36 x 10 and 50 x 60 = 3000) Partition 2-digit numbers to multiply by a single-digit number mentally. (E.g. 4 x 24 as 4 x 20 and 4 x 4) Multiply near multiples using rounding. (E.g. 33 x 19 as 33 x 20 – 33) Find doubles to double 100 and beyond using partitioning Begin to double amounts of money. (E.g. £35.60 doubled = £71.20.)	Transition from the grid method to using a vertical written method to multiply a one-digit by a 3-digit number  246 x 7 42 (6 X 7) 280 (40 X 7) 1400 (200 X 7) 1722 1 Use an efficient written method to multiply a 2-digit number by a number between 10 and 20 by partitioning (grid method)  x 40 6 10 400 60 8 320 48 720 108 = 828	Multiply whole numbers by 10 and 100 Use grid method to multiply a 2-digit or a 3-digit number by a number up to and including 6 Recall multiplication facts for multiplication tables up to 12 × 12 Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers Recognise and use factor pairs and commutativity in mental calculations Multiply two-digit and three-digit numbers by a one-digit number using formal written layout Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as *n* objects are connected to *m* objects.

	Division	Know by heart all the division facts up to 144 ÷ 12. Divide whole numbers by 10, 100 to give whole number answers or answers with one decimal place Divide multiples of 100 by 1-digit numbers using division facts. (E.g. 3200 ÷ 8 = 400) Use place value and number facts in mental division. (E.g. 245 ÷ 20 is double 245 ÷ 10) Divide larger numbers mentally by subtracting the 10th or 20th multiple as appropriate. (E.g. 156 ÷ 6 is 20 + 6 as 20x6=120 and 6x6=36) Find halves of even numbers to 200 and beyond using partitioning Begin to halve amounts of money. (E.g. Half of £52.40 = £26.20)	Use a written method to divide a 2-digit or a 3-digit number by a single-digit number.   Give remainders as whole numbers. Begin to reduce fractions to their simplest forms. Find unit and non-unit fractions of larger amounts. Short division with no remainders within the calculation or in the final answer.  Short division where remainders occur within the calculation. 	Know by heart all the division facts up to 144 ÷ 12. Divide whole numbers by 10 and 100 to give whole number answers or answers with one decimal place Perform divisions just above the 10th multiple using the written layout and understanding how to give a remainder as a whole number. Find unit fractions of amounts Recall division facts up to 144 ÷ 12. Use place value, known and derived facts to divide mentally. Recognise and use factor pairs in mental calculations

Upper Key Stage 2

	Overview of LKS2	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. Mental strategies for adding and subtracting increasingly large numbers will also be taught. These will draw upon children's robust understanding of place value and knowledge of number facts. Efficient and flexible strategies for mental multiplication and division are taught and practised, so that children can perform appropriate calculations even when the numbers are large, such as 40,000 x 6 or 40,000 ÷ 8. In addition, it is in Y5 and Y6 that children extend their knowledge and confidence in using written algorithms for multiplication and division. Fractions and decimals are also added, subtracted, divided and multiplied, within the bounds of children's understanding of these more complicated numbers, and they will also calculate simple percentages and ratios. Negative numbers will be added and subtracted.		
Year 5	***Addition***	Know numbers bonds to 1 and to the next whole number Add to the next 10 from a decimal number, *e.g. 13·6 + 6·4 = 20* Add numbers with two significant digits only, using mental strategies. (E.g. 3.4 + 4.8 or 23,000 + 47,000) Add one or two-digit multiples of 10, 100, 1000, 10,000 and 100,000. (E.g. 8000 + 7000 or 600,000 + 700,000) Add near multiples of 10, 100, 1000, 10,000 and 100,000 to other numbers. (E.g. 82,472 + 30,004) Add decimal numbers which are near multiples of 1 or 10, including money. *(E.g. 6·34 + 1·99 or £34·59 + £19·95)* Use place value and number facts to add two or more friendly numbers including money and decimals. (E.g. 3 + 8 + 6 + 4 + 7, 0.6 + 0.7 + 0.4, or 2,056 + 44)	Once the children are confident with the use of the expanded method, move to the compact method of column addition to add two or three whole numbers with up to 5 digits. Carry digits are recorded below the line, using the phrases 'carry ten' or 'carry one hundred' not carry one. This method can be applied to numbers with varying amounts of digits, including decimals. Eg, 258 + 87 345 1 1 366 + 458 824 1 1 Begin to add related fractions using equivalences. (E.g. ½ + $^1/_6$ = $^3/_6$ + $^1/_6$) Choose the most efficient method in any given situation	Add numbers with only 2-digits which are not zeros, e.g. 3.4 + 5.8 Derive swiftly and without any difficulty number bonds to 100 Add friendly large numbers using knowledge of place value and number facts Use expanded column addition to add pairs of 4- and 5-digit numbers Add whole numbers with more than 4 digits, including using formal written methods (columnar addition) Add numbers mentally with increasingly large numbers Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy Solve addition multi-step problems in contexts, deciding which operations and methods to use and why.

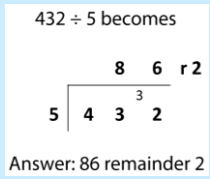
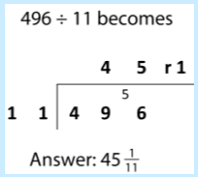
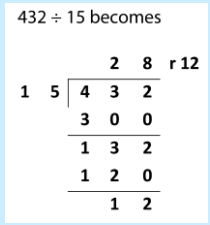
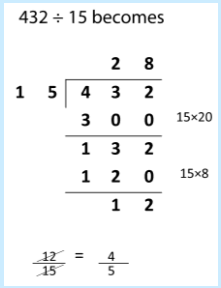
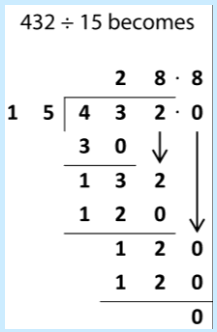
	Subtraction	Subtract numbers with two significant digits only, using mental strategies. (E.g. 6.2 – 4.5 or 72,000 – 47,000) Subtract one or two-digit multiples of 100, 1000, 10,000 and 100,000. (E.g. 8000 – 3000 or 600,000 – 200,000) Subtract one or two digit near multiples of 100, 1000, 10,000 and 100,000 from other numbers. (E.g. 82,472 – 30,004) Subtract decimal numbers which are near multiples of 1 or 10, including money. (E.g. 6·34 – 1·99 or £34·59 – £19·95) Use counting up subtraction, with knowledge of number bonds to 10/100 or £1, as a strategy to perform mental subtraction. (E.g. £10 - £3.45 or 1000 – 782] Recognise fraction complements to 1 and to the next whole number. (E.g. $1\ ^{2}/_{5} + {}^{3}/_{5} = 2$) 4 – 5	Use compact or expanded column subtraction to subtract numbers with up to 5 digits.  Use complementary addition for subtractions where the larger number is a multiple or near multiple of 1000. Use complementary addition for subtractions of decimals with up to two places incl. amounts of money Begin to subtract related fractions using equivalences. (E.g. $½ - {}^{1}/_{6} = {}^{2}/_{6}$) Choose the most efficient method in any given situation	Derive swiftly and without difficulty number bonds to 100 Use counting up with confidence to solve most subtractions, including finding complements to multiples of 1000. (E.g. 3000 – 2387 is done by  Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction) Subtract numbers mentally with increasingly large numbers Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy Solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

	Multiplication	Know by heart all the multiplication facts up to 12 x 12. Multiply whole numbers and one-and two-place decimals by 10, 100, 1000, 10,000 Use knowledge of factors and multiples in multiplication. (E.g. 43 x 6 is double 43 x 3, and 28 x 50 is ½ of 28 x 100 = 1400) Use knowledge of place value and rounding in mental multiplication. (E.g. 67 x 199 as 67 x 200 – 67) Use doubling and halving as a strategy in mental multiplication. (E.g. 58 x 5 = half of 58 x 10, and 34 x 4 is 34 doubled twice) Partition 2-digit numbers, including decimals, to multiply by a single-digit number mentally. (E.g. 6 x 27 as 6 x 20 (120) plus 6 x 7 (42) making 162 or 6.3 x 7 as 6 x 7 plus 0.3 x 7) Double amounts of money by partitioning. (E.g. £37.45 doubled = £37 doubled (£74) plus 45p doubled (90p) £74.90)	Use short multiplication to multiply a 1-digit number by a number with up to 4 digits  Use long multiplication to multiply 3-digit and 4-digit number by a number between 11 and 20   Choose the most efficient method in any given situation Find simple percentages of amounts 9e.g. 10%, 5%, 20%, 155 and 50%) Begin to multiply fractions and mixed numbers by whole numbers ≤ 10, e.g. $4 \times {}^{2}/_{3} = {}^{8}/_{3} = 2{}^{2}/_{3}$.	Know multiplication tables to 12x12 Multiply whole numbers and one-place decimals by 10, 100 and 1000 Use knowledge of factors as aids to mental multiplication. (E.g. 13 x 6 = double 13 x 3 and 23 x 5 is ½ of 23 x 10) Use grid method to multiply numbers with up to 4-digits by one-digit numbers. Use grid method to multiply 2-digit by 2-digit numbers. Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers Establish whether a number up to 100 is prime and recall prime numbers up to 19 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 Multiply numbers mentally drawing upon known facts Multiply whole numbers and those involving decimals by 10, 100 and 1000

	Division	Know by heart all the division facts up to 144 ÷ 12. Divide whole numbers by 10, 100, 1000, 10,000 to give whole number answers or answers with 1, 2 or 3 decimal places Use doubling and halving as mental division strategies. (E.g. 34 ÷ 5 is (34 ÷ 10) x 2) Use knowledge of multiples and factors, also tests for divisibility ,in mental division. (E.g. 246 ÷ 6 is 123 ÷ 3 and we know that 525 divides by 25 and by 3) Halve amounts of money by partitioning. (E.g. Half of £75.40 = half of £75 (37.50) plus half of 40p (20p) which is £37.70) Divide larger numbers mentally by subtracting the 10th or 100th multiple as appropriate. (E.g. 96 ÷ 6 is 10 + 6, as 10 × 6 = 60 and 6 × 6 = 36; 312 ÷ 3 is 100 + 4 as 100 x 3 = 300 and 4 x 3 = 12) Reduce fractions to their simplest form.	Use short division to divide a number with up to 4 digits by a number ≤12. 98 ÷ 7 becomes 1 4 r 2 7 | 9 8 Answer: 14 432 ÷ 5 becomes 8 6 r 2 5 | 4 3 2 Answer: 86 remainder 2 Give remainders as whole numbers or as fractions. Find non-unit fractions of large amounts. Turn improper fractions into mixed numbers and vice versa. Choose the most efficient method in any given situation	Know by heart division facts up to 144 ÷ 12 Divide whole numbers by 10, 100 or 1000 to give answers with up to one decimal place. Use doubling and halving as mental division strategies Use efficient chunking to divide numbers ≤ 1000 by 1-digit numbers. Find unit fractions of 2 and 3-diigt numbers Divide numbers mentally drawing upon known facts 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 Divide whole numbers and those involving decimals by 10, 100 and 1000
Year 6	***Addition***	Know by heart number bonds to 100 and use these to derive related facts. (E.g. 3.46 + 0.54 = 4) Derive quickly and without difficulty, number bonds to 1000 Add small and large whole numbers where the use of place value or number facts makes the calculation do-able 'in our heads'. (E.g. 34,000 + 8000.) Add multiples of powers of ten and near multiples of the same. (E.g. 6345 + 199.) Add negative numbers in a context such as temperature where the numbers make sense. Add two 1-place decimal numbers or two 2-place decimal numbers less than 1 (E.g. 4.5 + 6.3 or 0.74 + 0.33) Add positive numbers to negative numbers, e.g. calculate a rise in temperature, or continue a sequence beginning with a negative number	Use column addition to add numbers with up to 5 digits. 789 + 642 becomes 7 8 9 + 6 4 2 1 4 3 1 1 1 Answer: 1431 Use column addition to add decimal numbers with up to 3-digits Add mixed numbers and fractions with different denominators.	Derive swiftly and without difficulty, number bonds to 100 Use place value and number facts to add friendly large or decimal numbers, e.g. 3.4 + 6.6 or 26,000 + 5,400 Use column addition to add numbers with up to 4-digits. Use column addition to add pairs of two-place decimal numbers. Use their knowledge of the order of operations to carry out calculations involving the four operations Solve addition multi-step problems in contexts, deciding which operations and methods to use and why Solve problems involving addition Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

	Subtraction	Use number bonds to 100 to perform mental subtraction of any pair of integers by complementary addition. (E.g. 1000 – 654 as 46 + 300 in our heads Use number bonds to 1 and 10 to perform mental subtraction of any pair of one-place or two-place decimal numbers using complementary addition and including money. (E.g. 10 – 3.65 as 0.35 + 6, £50 – £34.29 as 71p + £15) Use number facts and place value to perform mental subtraction of large numbers or decimal numbers with up to two places. (E.g. 467,900 – 3,005 or 4.63 – 1.02) Subtract multiples of powers of ten and near multiples of the same. Subtract negative numbers in a context such as temperature where the numbers make sense.	Use column subtraction to subtract numbers with up to 6 digits. 874 – 523 becomes 8 7 4 – 5 2 3 3 5 1 Answer: 351 932 – 457 becomes 8 12 1 9 3 2 – 4 5 7 4 7 5 Answer: 475 Use complementary addition for subtractions where the larger number is a multiple or near multiple of 1000 or 10,000. Use complementary addition for subtractions of decimal numbers with up to three places including money. Subtract mixed numbers and fractions with different denominators.	Use number bonds to 100 to perform mental subtraction of numbers up to 1000 by complementary addition. (E.g. 1000 – 654 as 46 + 300 in our heads.) Use complementary addition for subtraction of integers up to 10,000. E.g. 2504 – 1878 as +2 +20 +100 +504 = 626 1878 1880 1900 2000 2504 Use complementary addition for subtractions of one-place decimal numbers and amounts of money. (E.g. £7.30 – £3.55 as +5p +40p +£3.30 = £3.75 £3.55 £3.60 £4.00 £7.30 Perform mental calculations, including with mixed operations and large numbers Solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why Solve problems involving subtraction Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

	Multiplication	Know by heart all the multiplication facts up to 12 x 12. Multiply whole numbers and decimals with up to three places by 10, 100 or 1000, e.g. 234 x 1000 = 234,000 and 0.23 x 1000 = 230) Identify common factors, common multiples and prime numbers and use factors in mental multiplication. (E.g. 326 x 6 is 652 x 3 which is 1956) Use place value and number facts in mental multiplication. (E.g. 40,000 x 6 = 24,000 and 0.03 x 6 = 0.18) Use doubling and halving as mental multiplication strategies, including to multiply by 2, 4, 8, 5, 20, 50 and 25 (E.g. 28 x 25 is ¼ of 28 x 100 = 700) Use rounding in mental multiplication. (34 x 19 as (20 x 34) – 34) Multiply one and two-place decimals by numbers up to and including 10 using place value and partitioning. (E.g. 3.6 x 4 is 12 + 2.4 or 2.53 x 3 is 6 + 1.5 + 0.09) Double decimal numbers with up to 2 places using partitioning *e.g. 36·73 doubled is double 36 (72) plus double 0·73 (1·46)*	Use short multiplication to multiply a 1-digit number by a number with up to 4 digits 24 × 6 becomes 2 4 × 6 1 4 4 2 Answer: 144 Use long multiplication to multiply a 2-digit by a number with up to 4 digits 24 × 16 becomes 2 2 4 × 1 6 2 4 0 1 4 4 3 8 4 Answer: 384 Use short multiplication to multiply a 1-digit number by a number with one or two decimal places, including amounts of money. Multiply fractions and mixed numbers by whole numbers. Multiply fractions by proper fractions. Use percentages for comparison and calculate simple percentages.	Know by heart all the multiplication facts up to 12 x 12. Multiply whole numbers and one-and two-place decimals by 10, 100 and 1000. Use an efficient written method to multiply a one-digit or a teens number by a number with up to 4-digits by partitioning (grid method). Multiply a one-place decimal number up to 10 by a number ≤100 using grid method. Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication Perform mental calculations, including with mixed operations and large numbers Identify common factors, common multiples and prime numbers Use their knowledge of the order of operations to carry out calculations involving the four operations Solve problems involving multiplication Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

	Division	Know by heart all the division facts up to 144 ÷ 12. Divide whole numbers by powers of 10 to give whole number answers or answers with up to three decimal places. Identify common factors, common multiples and prime numbers and use factors in mental division. (E.g. 438 ÷ 6 is 219 ÷ 3 which is 73) Use tests for divisibility to aid mental calculation. Use doubling and halving as mental division strategies, e.g. to divide by 2, 4, 8, 5, 20 and 25. (E.g. 628 ÷ 8 is halved three times: 314, 157, 78.5) Divide one and two place decimals by numbers up to and including 10 using place value. (E.g. 2.4 ÷ 6 = 0.4 or 0.65 ÷ 5 = 0.13, £6.33 ÷ 3 = £2.11) Halve decimal numbers with up to 2 places using partitioning *e.g. Half of 36·86 is half of 36 (18) plus half of 0·86 (0·43)* Know and use equivalence between simple fractions, decimals and percentages, including in different contexts. Recognise a given ratio and reduce a given ratio to its lowest terms.	Use short division to divide a number with up to 4 digits by a 1-digit or a 2-digit number   Use long division to divide 3-digit and 4-digit numbers by 'friendly' 2-digit numbers.    Give remainders as whole numbers or as fractions or as decimals Divide a one-place or a two-place decimal number by a number ≤ 12 using multiples of the divisors. Divide proper fractions by whole numbers.	Know by heart all the division facts up to 144 ÷ 12. Divide whole numbers by 10, 100, 1000 to give whole number answers or answers with up to two decimal places. Use efficient chunking involving subtracting powers of 10 times the divisor to divide any number of up to 1000 by a number ≤ 12. (E.g. 836 ÷ 11 as 836 – 770 (70x11) leaving 66 which is 6x11. So that we have 70 + 6 = 76 as the answer). Divide a one-place decimal by a number ≤10 using place value and knowledge of division facts. Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context Perform mental calculations, including with mixed operations and large numbers Use their knowledge of the order of operations to carry out calculations involving the four operations Solve problems involving division Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.