THE ROCHE SCHOOL CALCULATION POLICY 2023

At the Roche School, we adopt a 'streaming' strategy for the learning of mathematics to enable us to cater for every child's needs and rate of progress individually. We see the progression of calculation strategies as dependent on when each child is ready to move to the next stage, rather than simply by age. As such, the timing of the progression of learning of strategies below is considered a minimum requirement in each age group, with some flexibility both for the most able and those requiring consolidation of mathematical skills.

For an overview of all calculation strategies and when they are required (*mental strategies; ** written methods; ***inverse operations, estimating and checking answers; ** problem solving), see separate Progression Map documents for (1) Addition and Subtraction; (2) Multiplication and Division.**

Key skills and timings:

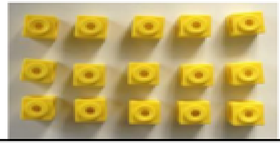
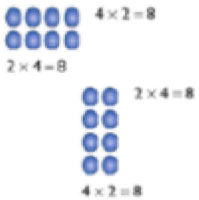
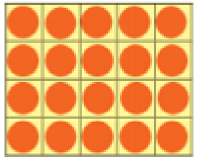
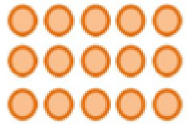
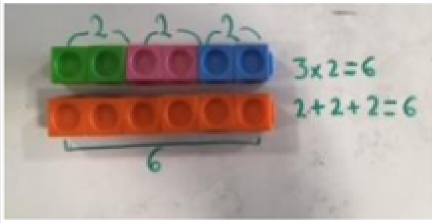
- **Mental calculation** skills are vital.
- Children need to have secure mental representations of numbers and number patterns. So number bonds to 20 (addition <u>and subtraction</u>, including bridging 10 should be known 'by heart') by KS2
- All times tables and their related divisions should (ideally) be known by the end of Spring Term in Year 4
- Children need the ability to **estimate,** so ROUNDING skills are developed early. These skills are helpful when attempting more challenging calculation problems.

PLEASE NOTE: WHILE EXPECTATIONS FOR CALCULATING WITH FRACTIONS ARE LISTED IN THIS DOCUMENT, A SEPARATE 'CALCULATING WITH FRACTIONS IN-DEPTH' DOCUMENT WILL BE AVAILABLE SEPARATELY.

In order for all children to access mathematical understanding we employ a variety of learning approaches.

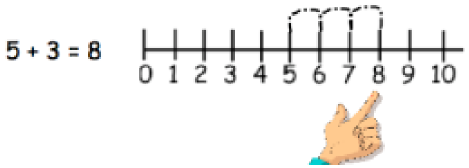
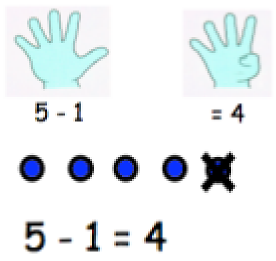
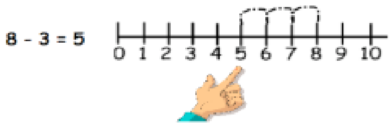
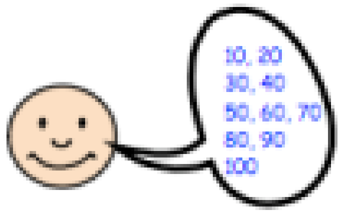
UNDERSTANDING CALCULATION

From CONCRETE, through PICTORIAL to ABSTRACT

	CONCRETE	PICTORIAL	ABSTRACT
Arrays- showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find **commutative** multiplication sentences.   Link arrays to area of rectangles.	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15
Bar models representing multiplication.	 	6 2 | 2 | 2 2 + 2 + 2 = 6 3 x 2 = 6 20 5 | 5 | 5 | 5 5 + 5 + 5 + 5 = 20 4 x 5 = 20	3 x 2 = 6 4 x 5 = 20

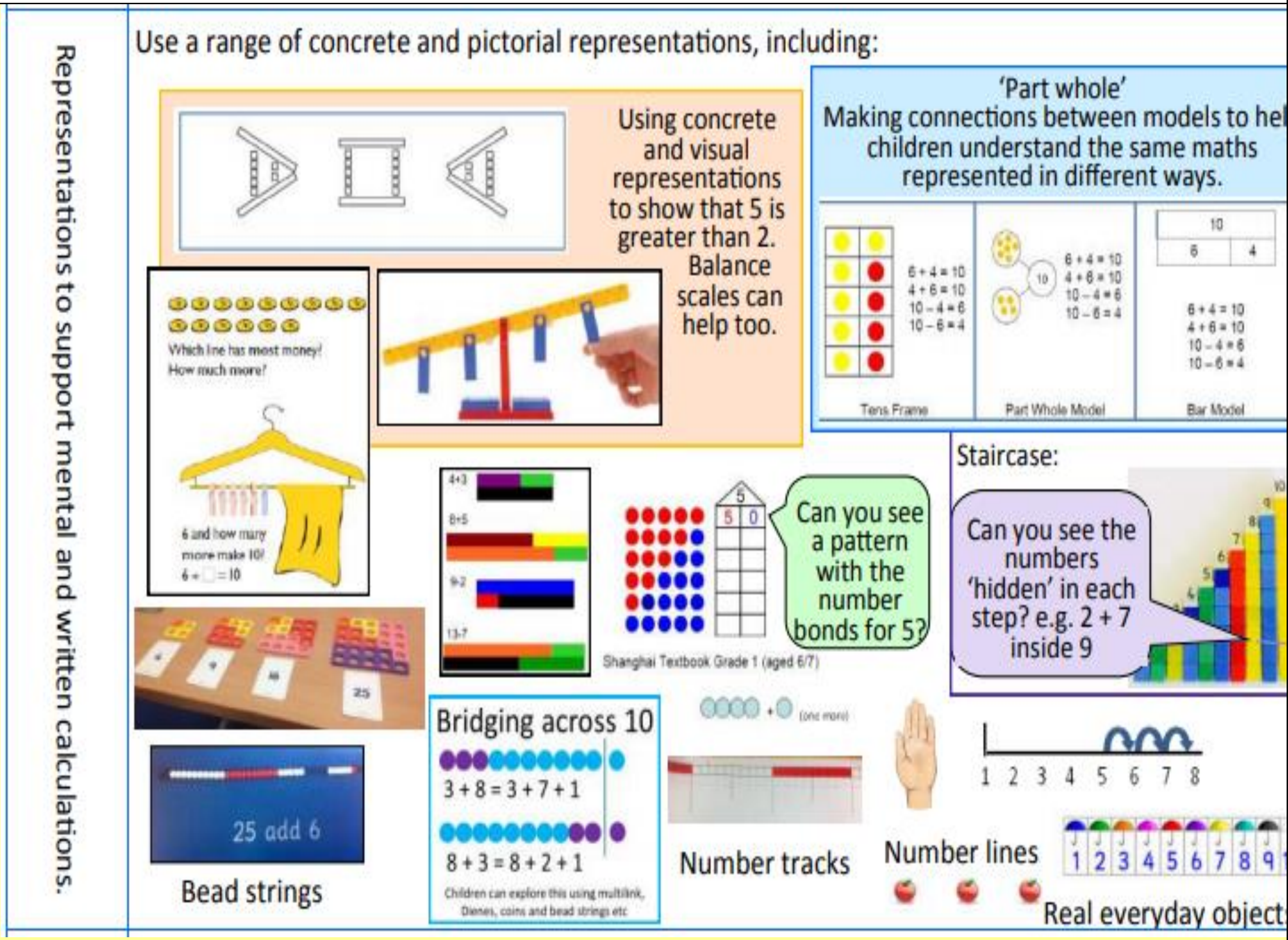
The Roche School

Calculation Guidelines for Foundation Stage (Reception Class)

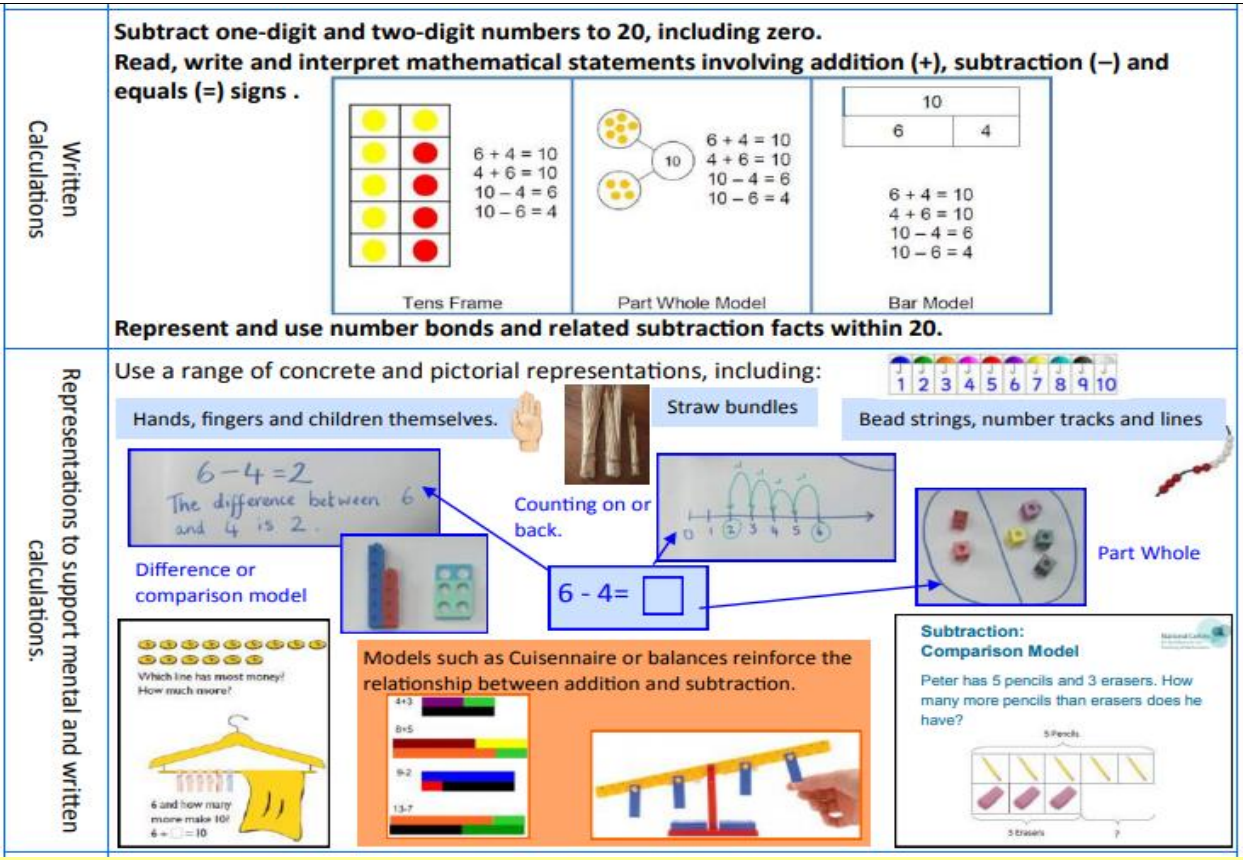
ADDITION	SUBTRACTION	MULTIPLICATION	DIVISION
Children begin to record in the context of play or practical activities and problems.			
Begin to relate addition to combining two groups of objects • Make a record in pictures, words or symbols of addition activities already carried out. • Construct number sentences to go with practical activities • Use of games, songs and practical activities t o begin using vocabulary Solve simple word problems using their fingers  Can find one more to ten. Higher Ability/ Gifted and Talented children progress to using a number line. They jump forwards along the number line using finger. 	Begin to relate subtraction to 'taking away' • Make a record in pictures, words or symbols of subtraction activities already carried out • Use of games, songs and practical activities to begin using vocabulary • Construct number sentences to go with practical activities • Relate subtraction to taking away and counting how many objects are left.  Can find one less to ten. Higher Ability/ Gifted and Talented Progression:  Counting backwards along a number line using finger.	Real life contexts and use of practical equipment to count in repeated groups of the same size: • Count in twos; fives; tens Also chanting in 2s, 5s and 10s. 	Share objects into equal groups Use related vocabulary Activities might include: • Sharing sweets on a child's birthday • Sharing activities in the home corner • Count in tens/twos • Separate a given number of objects into two groups (addition and subtraction objective in reception being preliminary to multiplication and division) Count in twos, tens How many times? How many are left/left over? Group Answer Right, wrong What could we try next? How did you work it out? Share out Half, halve

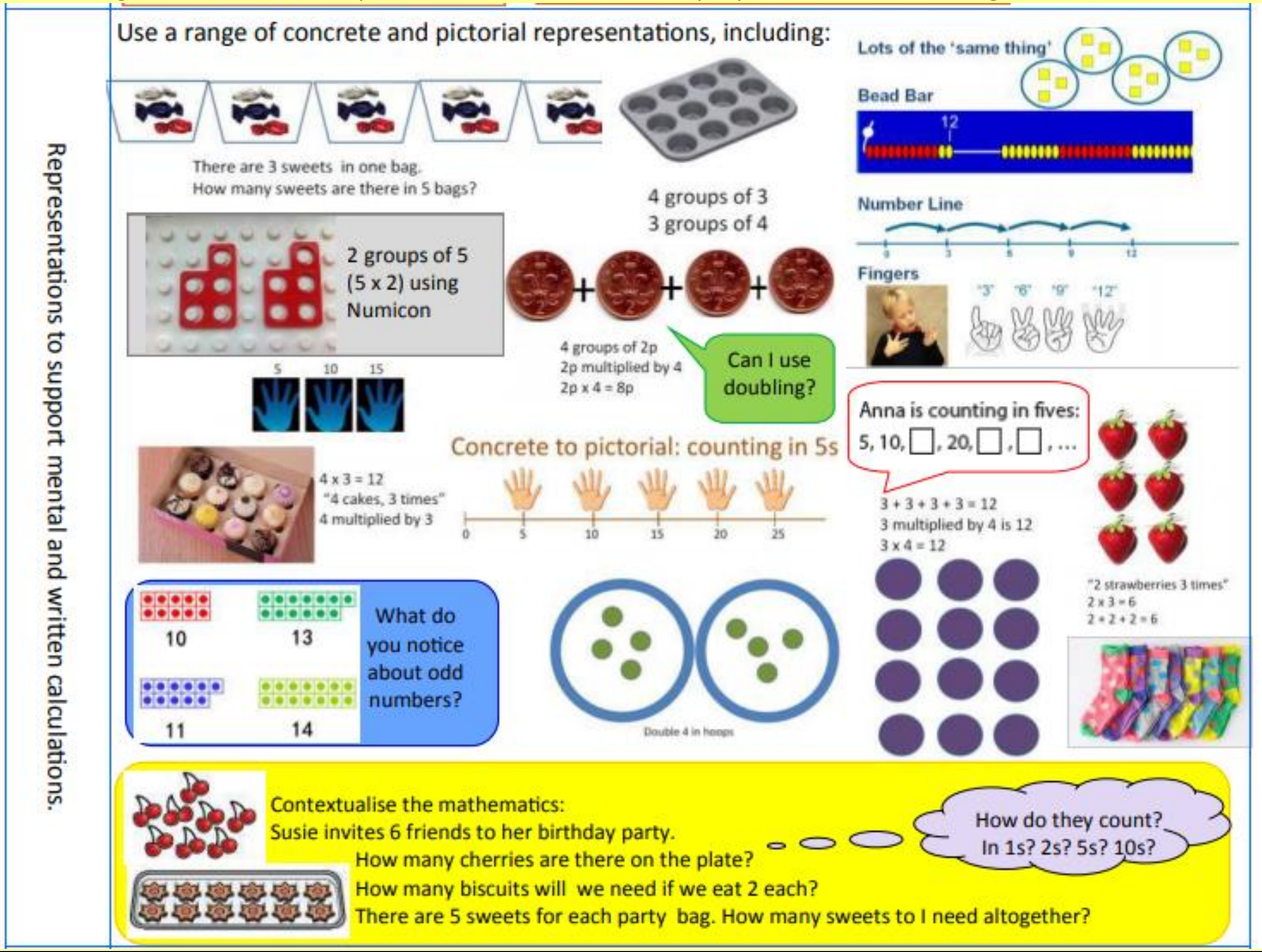
Key Stage 1

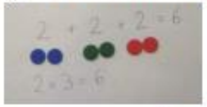
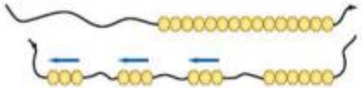
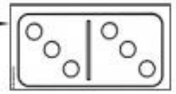
Year		Mental calculation	Written Calculation	Default for ALL children
	Overview of KS1	Children in Years 1 and 2 will be given a really solid foundation in the basic building blocks of mental and written arithmetic. Through being taught place value, they will develop an understanding of how numbers work, 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.		

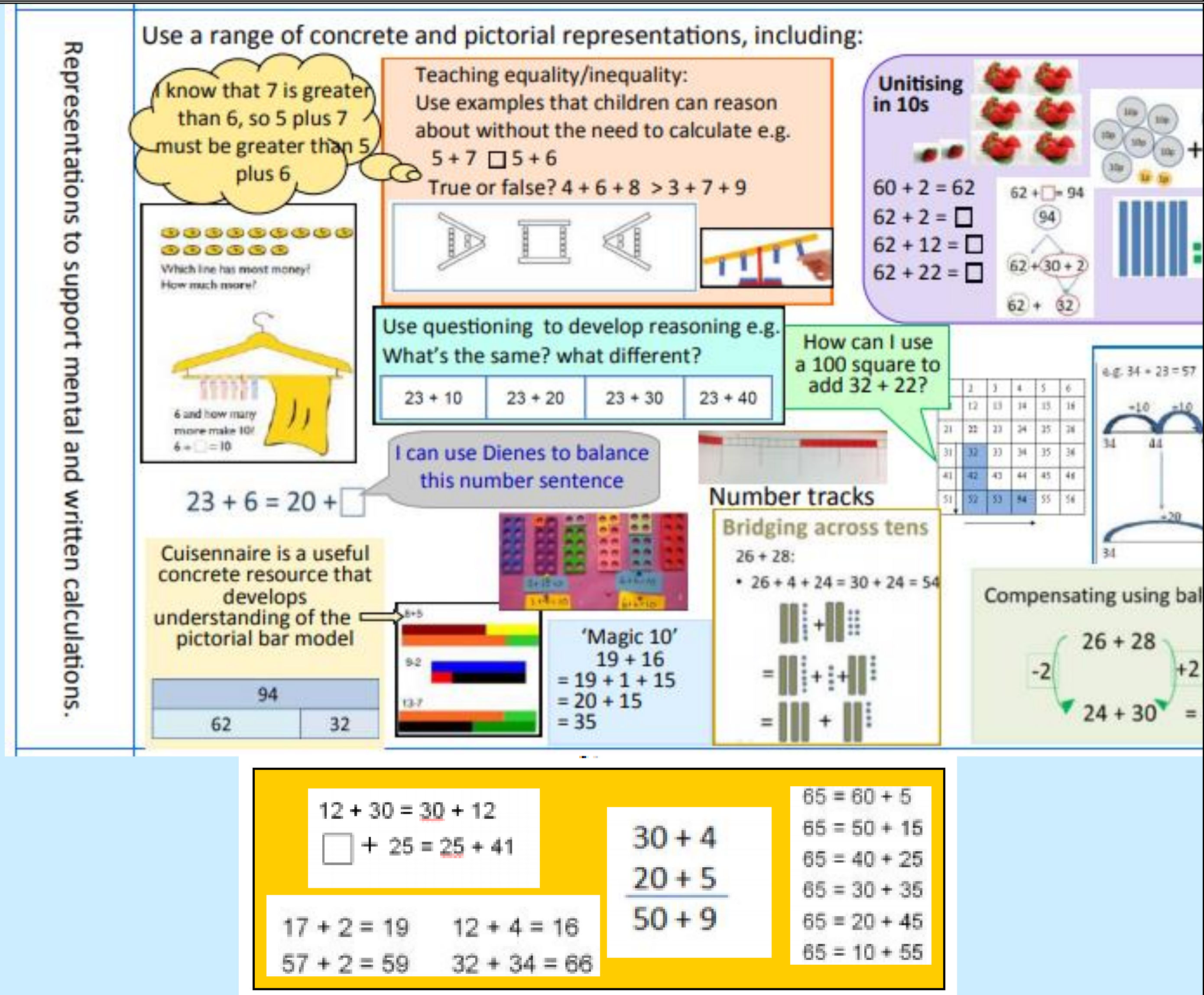
<table>
<tr><th>Year</th><th></th><th>Mental calculation</th><th>Written Calculation</th><th>Default for ALL children</th></tr>
<tr><td>Year 1</td><td>Addition</td><td>Number bonds (‘story of’ 5, 6, 7, 8, 9 and 10)
Count on in ones from a given 2-digit number
Add two single-digit numbers
Add three single-digit 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</td><td>


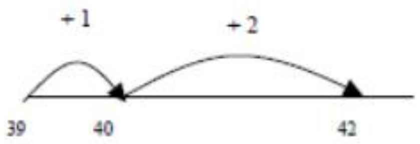
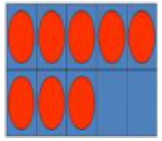
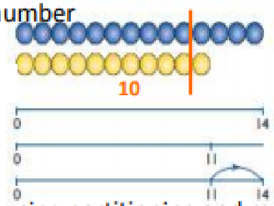
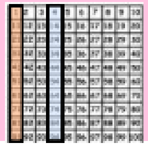
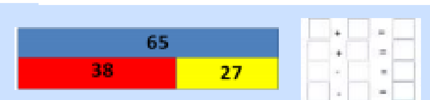
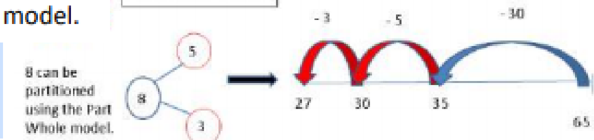
</td><td>Pairs with a total of 10
Counting in ones
Counting in tens
Count on 1 from any given 2-digit number</td></tr>
</table>

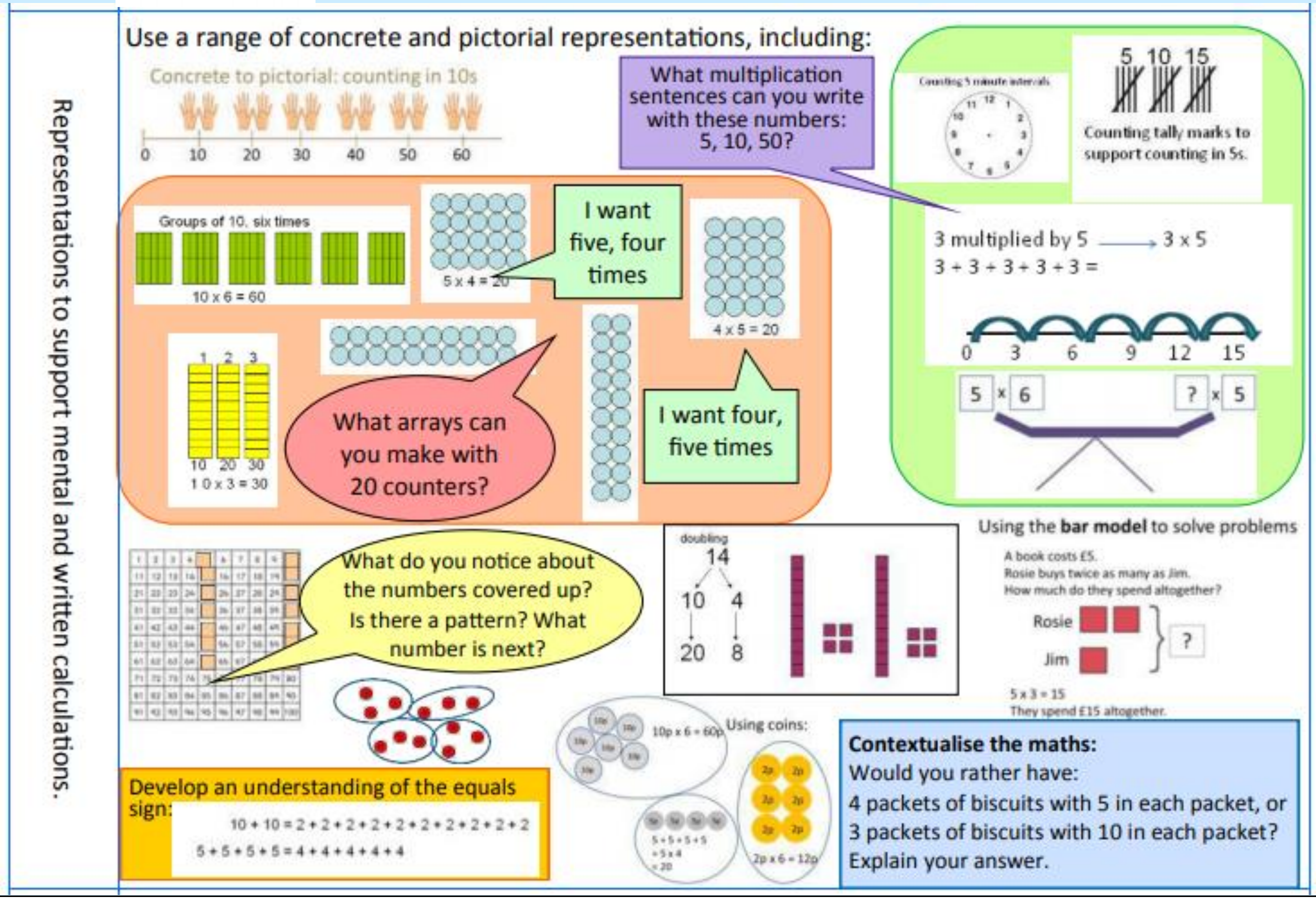
Year		Mental calculation	Written Calculation	Default for ALL children
	Subtraction	Number bonds ('story of' 5, 6, 7, 8, 9 and 10) Count back in ones from a given 2-digit number Subtract one single-digit number from another Count back in tens from any given 2-digit number Subtract 10 from any given 2-digit 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…		Pairs with a total of 10 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

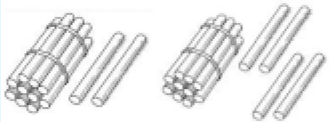
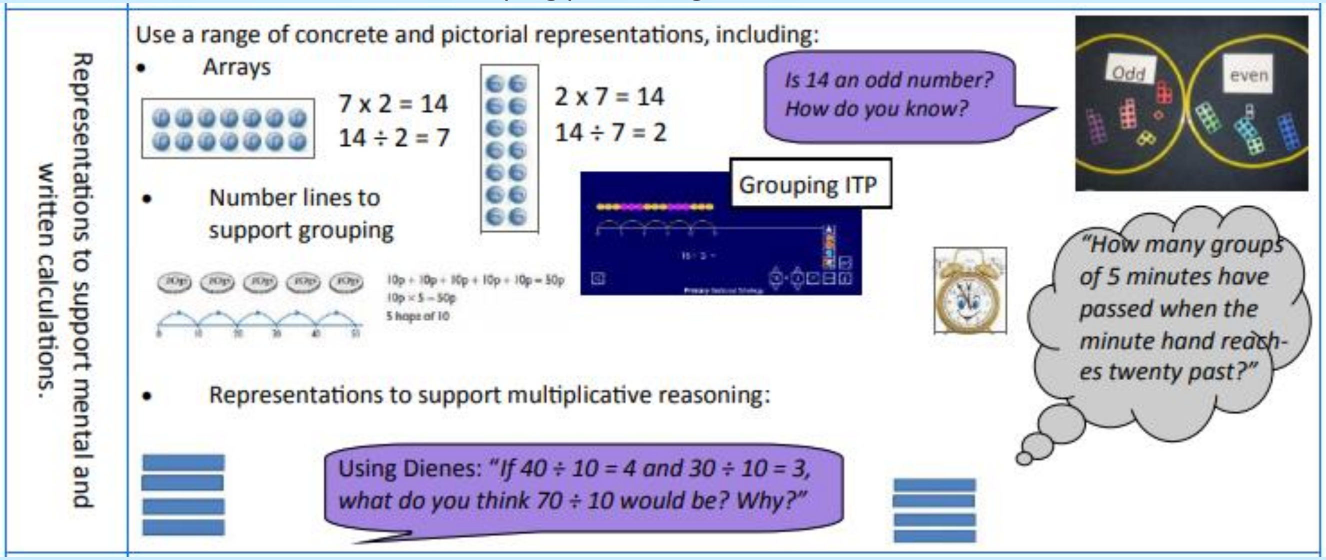
Year		Mental calculation	Written Calculation	Default for ALL children
	Multiplication	Begin to count in 2s, 5s and 10s Begin to say what three 5s are by counting in 5s or what four 2s are by counting in 2s, etc. Double numbers to 10	Although there is no statutory requirement for written multiplication in Year 1, it may be helpful to encourage children to begin to write it as a repeated addition sentence in preparation for Year 2 E.g. 2 + 2 + 2 + 2 = 8 	Begin to count in 2s and 10s Double numbers to 5 using fingers

Year		Mental calculation	Written Calculation	Default for ALL children
	Division	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.	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.) Representations to support mental and written calculations. Use a range of concrete and pictorial representations, including: • Manipulatives to support children's own recording; and understanding of *sharing* and the link with multiplication. *"How can we share 6 cakes between 2 people?"*  Here, the cakes are placed in an array formation.  *How many 2 tiles can we fit on the 6 tile?*  Moving from concrete to pictorial, counters represent the cakes to reinforce the relationship between multiplication and division. • Manipulatives, and real-life objects to support children's own recording; and understanding of *grouping* and the link with multiplication.   Coat hangers and socks support calculation of 8÷2 Bead strings  15 ÷ 2 using grouping model *"Double 3 is 6. Half of 6 is 3."*  • Dominoes and dice to reinforce concepts of doubling and halving.	Begin to count in 2s and 10s Find half of even numbers by sharing

Year		Mental calculation	Written Calculation	Default for ALL children
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 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 Add any pair of 2-digit numbers		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

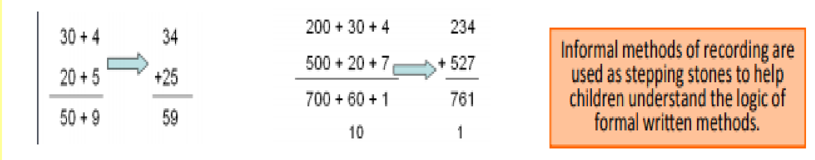
Year		Mental calculation	Written Calculation	Default for ALL children
	Subtraction	Number bonds – knowing all the pairs of numbers which make all the numbers to 12 Count back in ones and tens from any given 2-digit number Subtract a single-digit number from any 2-digit number using number facts, including 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.	Jottings to support informal methods: **Bridge through 10 where necessary** 32 - 17  **Written recording:** 37 – 12 = 37 – 10 - 2 = 27 – 2 = 25  Continue to use of a range of concrete and pictorial representations from Year 1, including Bar model to support understanding of **difference.** (See below).  54—32 = 22 - = signs and missing numbers Continue using a range of equations as in Year 1 but with appropriate numbers. Extend to 14 + 5 = 20 - □ Find a small difference by counting up 42 – 39 = 3  Representations to support mental and written calculations. Informal methods to support written subtraction calculations Practical partitioning of a 2-digit number  In Year 1 leads to:  The difference between 11 and 14 is 3. 14 – 11 = 3 11 + □ = 14 which can lead to exploration and variation 4 - 1 = 3 14 -11 = 3 24 -21 = 3 □  Subtract (without decomposition) using partitioning and manipulatives, e.g. Dienes or straw bundles To calculate 35-22, remove 22.  Then record: **35-22=13**.  Pupils experience bridging through 10 using number bonds and the Part Whole model. 65 – 38 = ...   	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

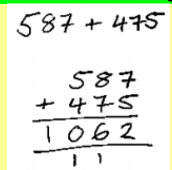
Year		Mental calculation	Written Calculation	Default for ALL children
	Multiplication	Count in 2s, 5s and 10s Begin to count in 3s. Begin to understand that multiplication is repeated addition and to use arrays (E.g. 3 x 4 is three rows of 4 dots) Begin to learn the 2x, 3x, 5x and 10x tables, seeing 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	calculate mathematical statements for multiplication and division 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 7 x 2 = □ 7 x □ = 14 □ x 2 = 14 △ x □ = 14 	Count in 2s, 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

Year		Mental calculation	Written Calculation	Default for ALL children
	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)	"There are 26 straws. ½ of the straws is equal to 13 straws."  ½ of 26 = 13 26 ÷ 2 = 13 Pupils decode a problem first, represent it using manipulatives and jottings; and finally record it symbolically. The importance of the relationship between known multiplication facts and the concept of division are essential for children to link their developing processing skills.  	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

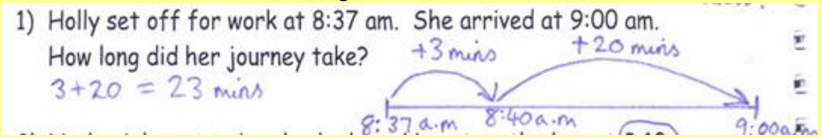
Lower Key stage 2

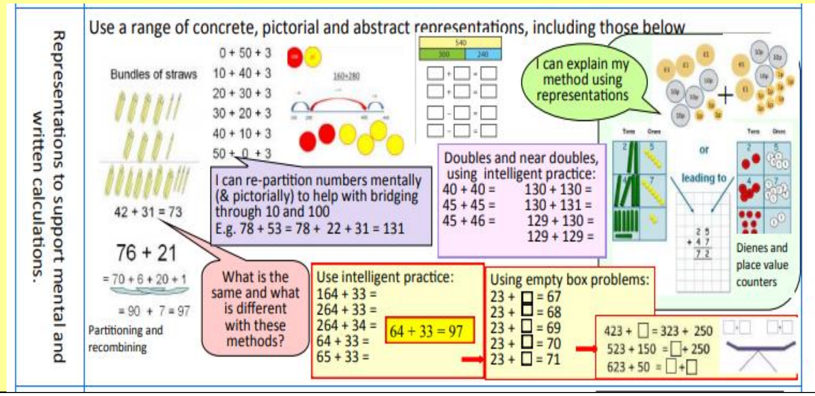
	Overview of LKS2	In the lower juniors, children build on the concrete and conceptual understandings they have gained in the Infants to develop a real mathematical understanding of the four operations, in particular developing arithmetical competence in relation to larger numbers. In addition and subtraction, 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 and two-place decimals (often through use of money), multiplying and dividing whole numbers by 10 and 100. EMPHASISE THE PLACE VALUE OF DIGITS WITHIN A NUMBER BEFORE AND DURING ANY FORMAL CALCULATION STRATEGIES.

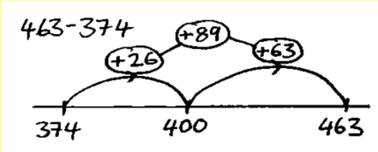
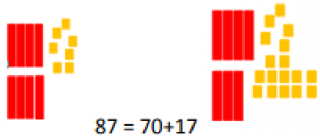
<table>
<tr>
<td>Year 3</td>
<td>Addition</td>
<td>Know pairs with each total to 20
Know pairs of multiples of 10 with a total of 100
Add any two 2-digit numbers by counting on in 10s and 1s or by using partitioning
Add multiples and near multiples of 10 and 100
Perform place value additions without 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.</td>
<td>Use expanded column addition to add two or three 3-digit numbers or three 2-digit numbers


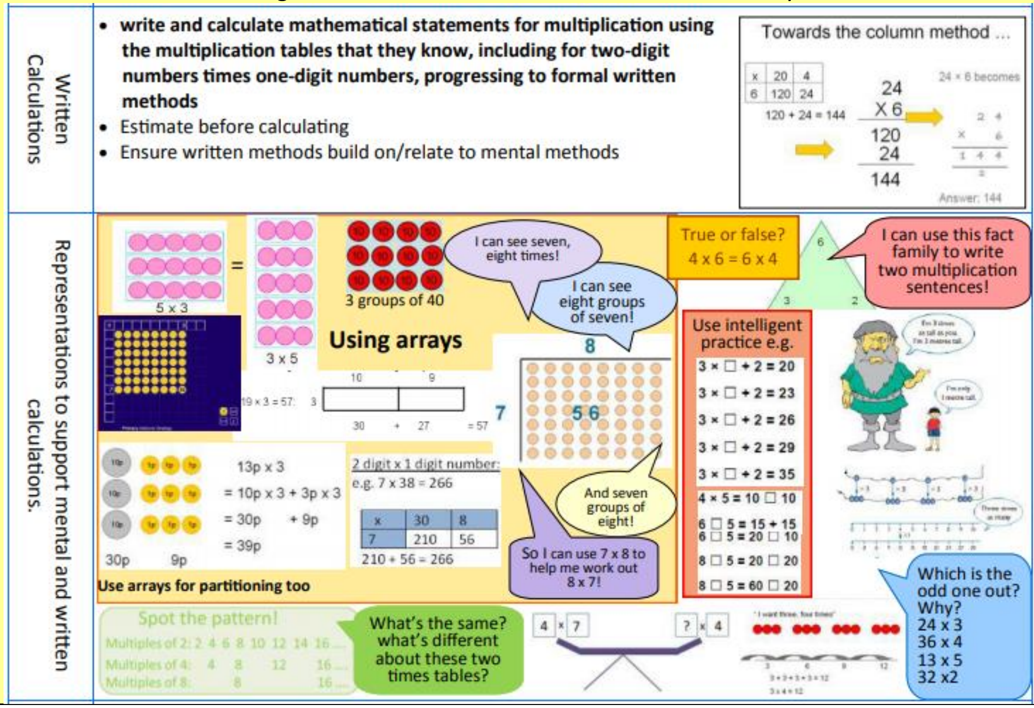
Begin to use compact column addition to add numbers with three digits.


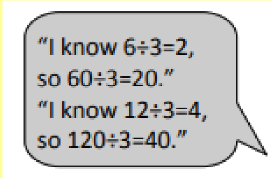
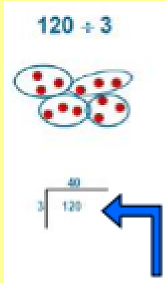
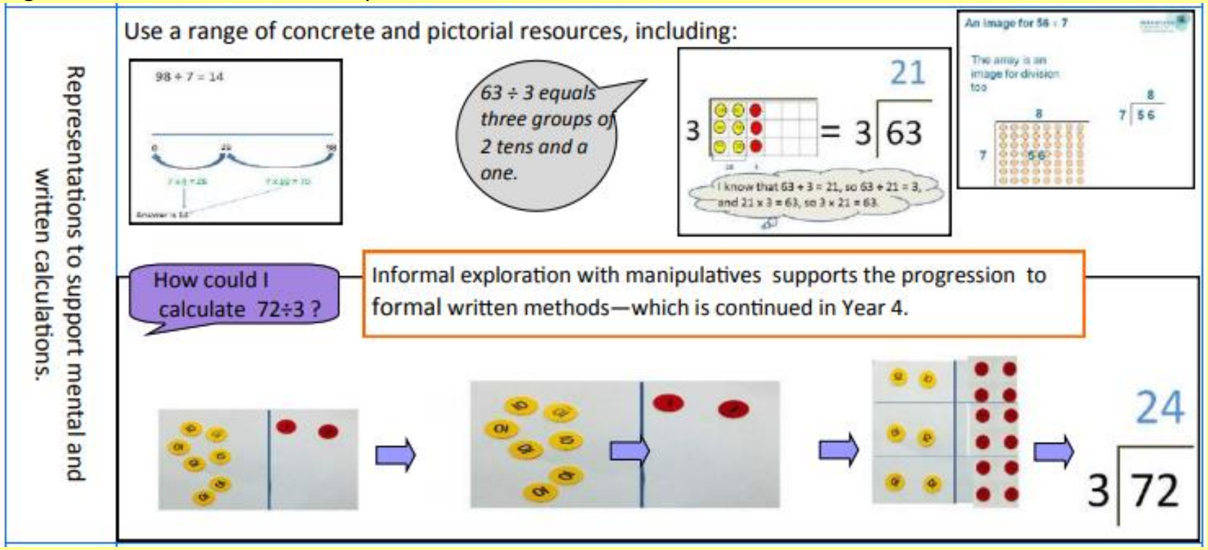
Begin to add like fractions. (E.g. $^{3}/_{8} + ^{1}/_{8} + ^{1}/_{8}$)
Recognise fractions that add to 1. (E.g. ¼ + ¾ or $^{3}/_{5} + ^{2}/_{5}$)

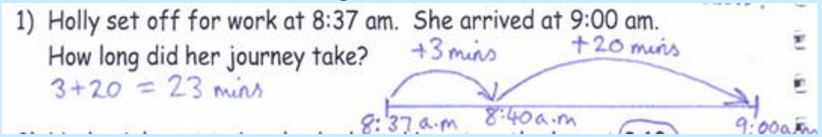
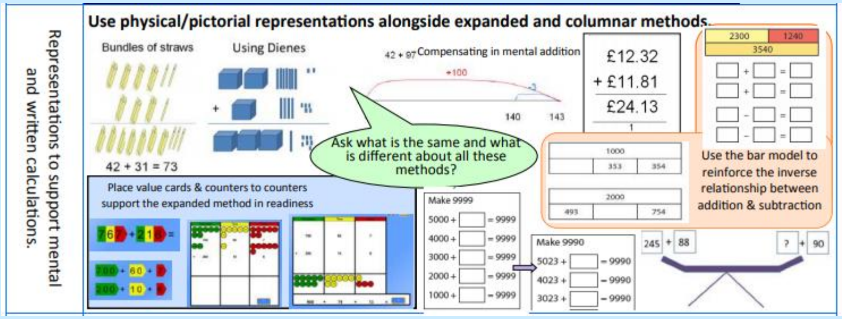
Use number lines for calculating with time.


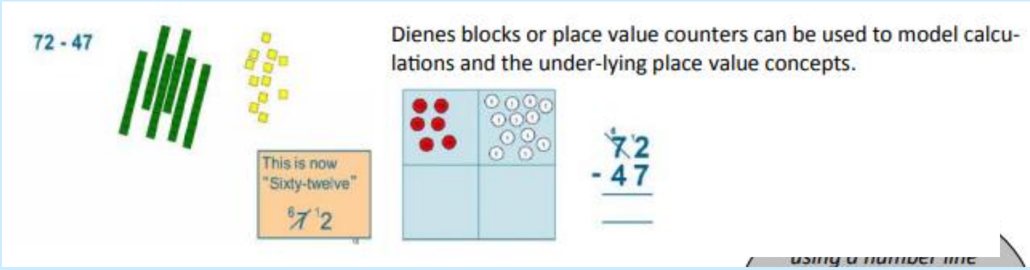
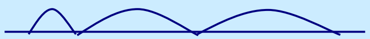

</td>
<td>Know pairs of numbers which make each total up to 10, and which total 20
Add two 2-digit numbers by counting on in tens and ones (E.g. 56 + 35 is 56 + 30 and then add the 5) to support mental calculation.
Understand simple place value additions: 200 + 40 + 5 = 245
Use place value to add multiples of 10 or 100</td>
</tr>
</table>

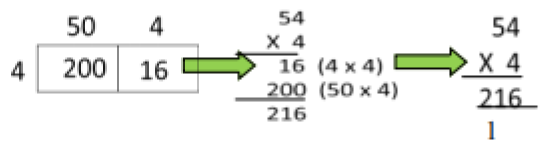
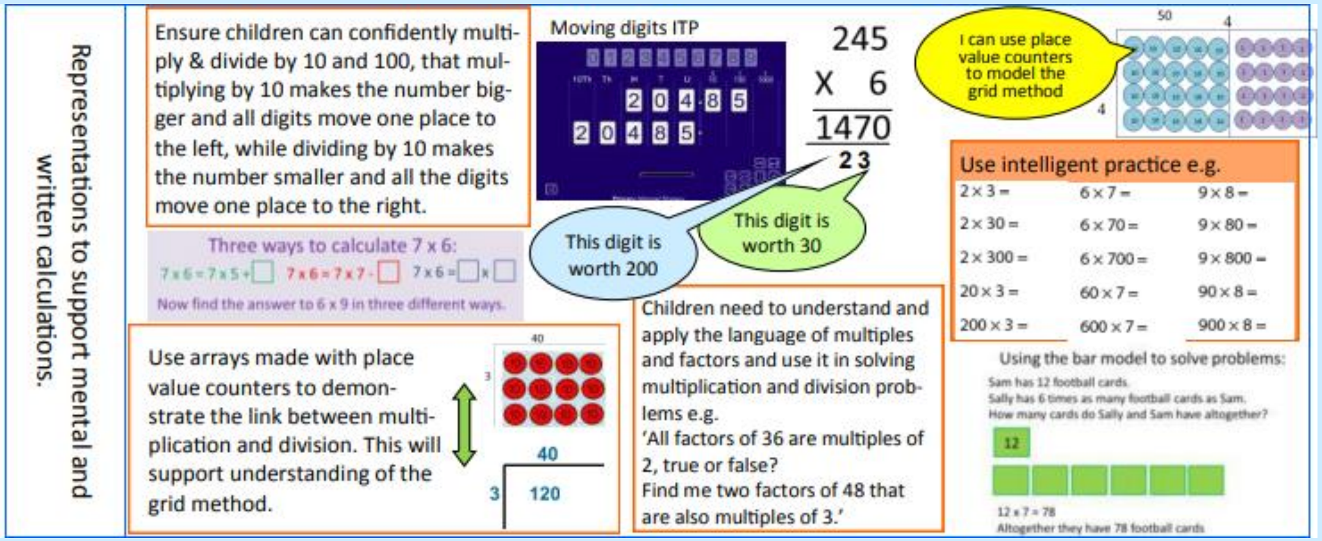
	Subtraction	Know pairs with each total to 20 Subtract any two 2-digit numbers Perform place value subtractions without a struggle. (E.g. 536 – 30 = 506, etc.) Subtract 2-digit numbers from numbers >100 by counting up. (E.g. 143 – 76 is done by starting at 76, add 4 (80) then add 20 (100) then add 43 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 (by counting on first).	Use counting up as an informal written strategy for subtracting pairs of three-digit numbers, e.g. 423 – 357 is +3 +40 +23 = 66 357 360 400 423  (1)Extended columnar - no exchange Extended method 87 - 53 = 80 and 7 - 50 and 3 30 and 4 = 34 (2) Extended columnar – with exchange: 87-58 becomes 70 +17 -50 + 8 20 + 9  87 = 70+17 When ready begin to use formal columnar subtraction: 4 12 1 ~~5~~ ~~3~~ 3 - 1 8 7 3 4 6 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 +3 +10 +10 +2 = 25 47 50 60 70 2 Subtract multiples of 5 from 100 by counting up +5 +60 = 65 35 40 100 Subtract multiples of 10 and 100

	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. Move towards an understanding and use of formal column method when ready  	Know by heart the 2x, 3x, 4x, 5x and 10x tables Double given tables facts to get others Double numbers up to 25 and multiples of 5 to 50

	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	Perform divisions just above the 10th multiple using the written layout and understanding how to give a remainder as a whole number. Make connections and hypothesese based on known facts:   New written methods can be modelled alongside mental or informal methods to ensure understanding. Introduce ‘Chunking’ to explain the process of formal short division: **3. Chunking- Using Multiples of the Divisor** **90÷5 = 18** **90** **- 50 (10 x 5)** **40** **- 40 (8 x 5)** **0** Begin to introduce formal ‘bus stop’ division.  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.

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, 4-digit numbers and beyond. Begin to use addition with decimals: $\begin{array}{r} 24.5 \\ +17.6 \\ \hline 42.1 \\ \hline {\scriptstyle 1\,1} \end{array}$ 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) Use number lines for calculating with time.  	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

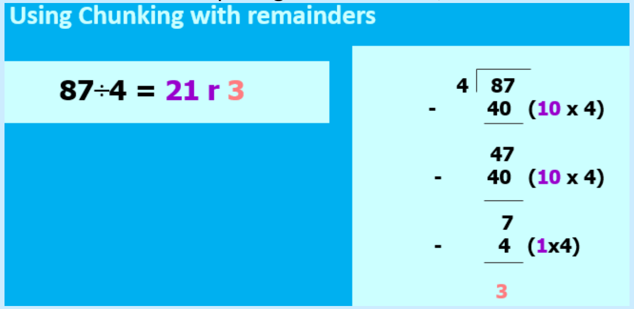
	Subtraction	Subtract any two 2-digit numbers Know by heart/quickly derive number bonds to 100 Perform place value subtractions without a struggle. (E.g. 4736 – 706 = 4030, etc.) Subtract multiples and near multiples of 10, 100 and 100 Subtract by counting up. (E.g. 503 – 368 is done by adding: 368 +2 +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 for children still grasping the concept.  Then move onto formal columnar subtraction when a child is ready: $\begin{array}{r} {}^{4}\cancel{5}\,{}^{12}\cancel{3}\,{}^{1}3 \\ -\ 1\,8\,7 \\ \hline 3\,4\,6 \end{array}$ 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.

	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.)	• **multiply two-digit and three-digit numbers by a one-digit number using formal written layout** • Estimate before calculating • Ensure written methods build on/relate to mental methods (e.g. grid method) based on an understanding of place value • Use grid and expanded column methods as stepping stones alongside  Key skills to support: • know or quickly recall multiplication facts up to 12 × 12 • understand the effect of multiplying numbers by 10, 100 or 1000 • multiply multiples of 10, for example, 20 × 40; • approximate, e.g. recognise that 72 × 38 is approximately 70 × 40 = 2800 and use this information to check whether their answer appears sensible  	Know by heart multiplication tables up to 10 x 10 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

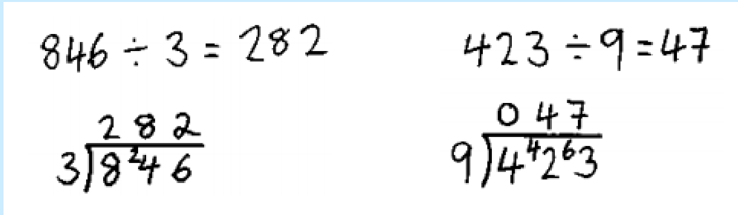
Division

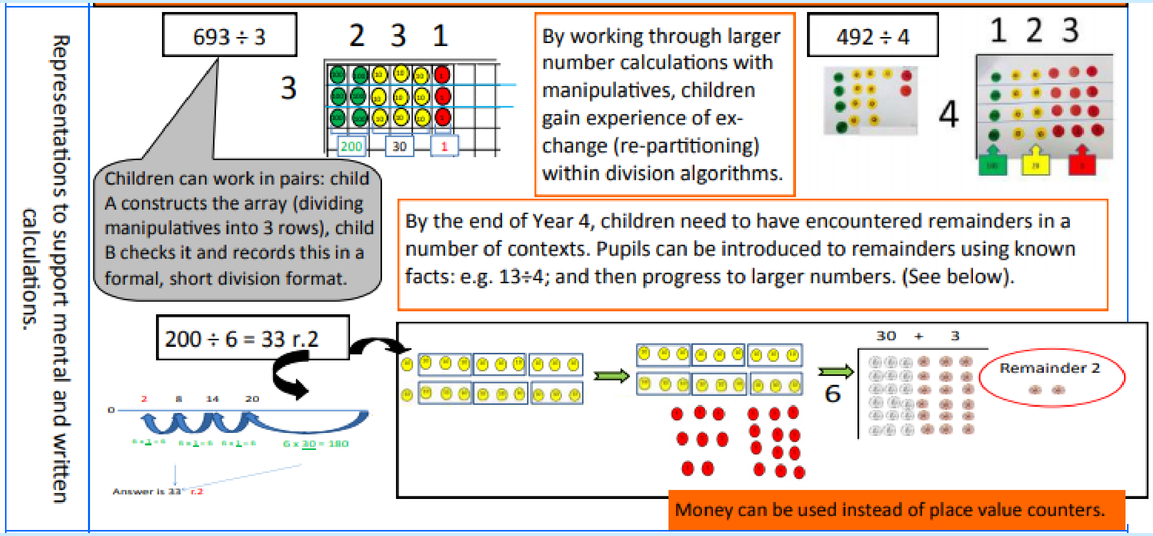
Know by heart all the division facts up to 144 ÷ 12.
Divide whole numbers by 10, 100 to give whole number answers or answers with one decimal place
Divide multiples of 100 by 1-digit numbers using division facts. (E.g. 3200 ÷ 8 = 400)
Use place value and number facts in mental division. (E.g. 245 ÷ 20 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) BEFORE moving on to the formal BUS-STOP method.
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. For children requiring consolidation, refer back to 'chunking':



For most, formal bus-stop division is expected, leading to higher level calculations by the end of Year 4, beginning of Year 5:

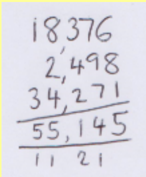


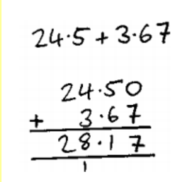


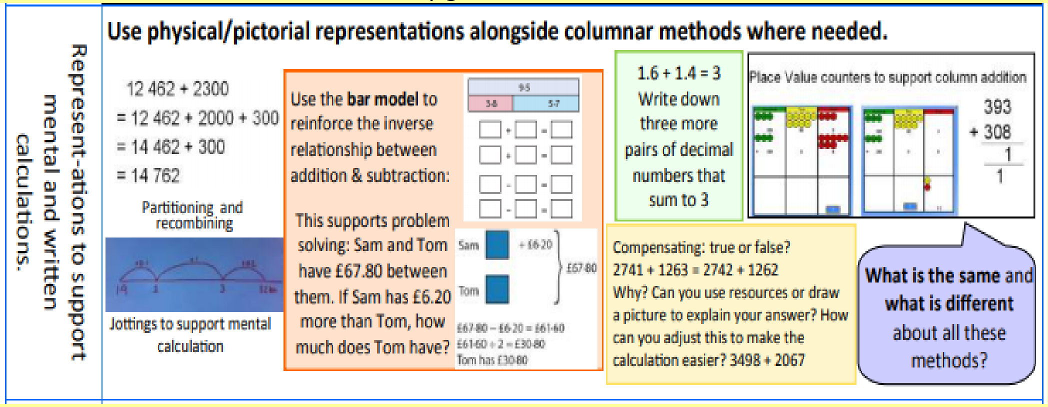
Begin to reduce fractions to their simplest forms.
Find unit and non-unit fractions of larger amounts.

Know by heart all the division facts up to 100 ÷ 10.
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

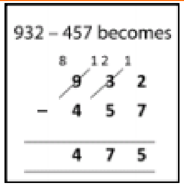
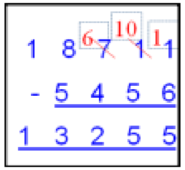
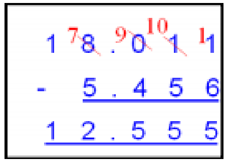
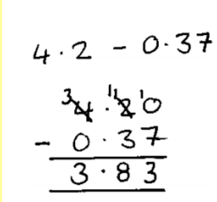
Upper Key stage 2

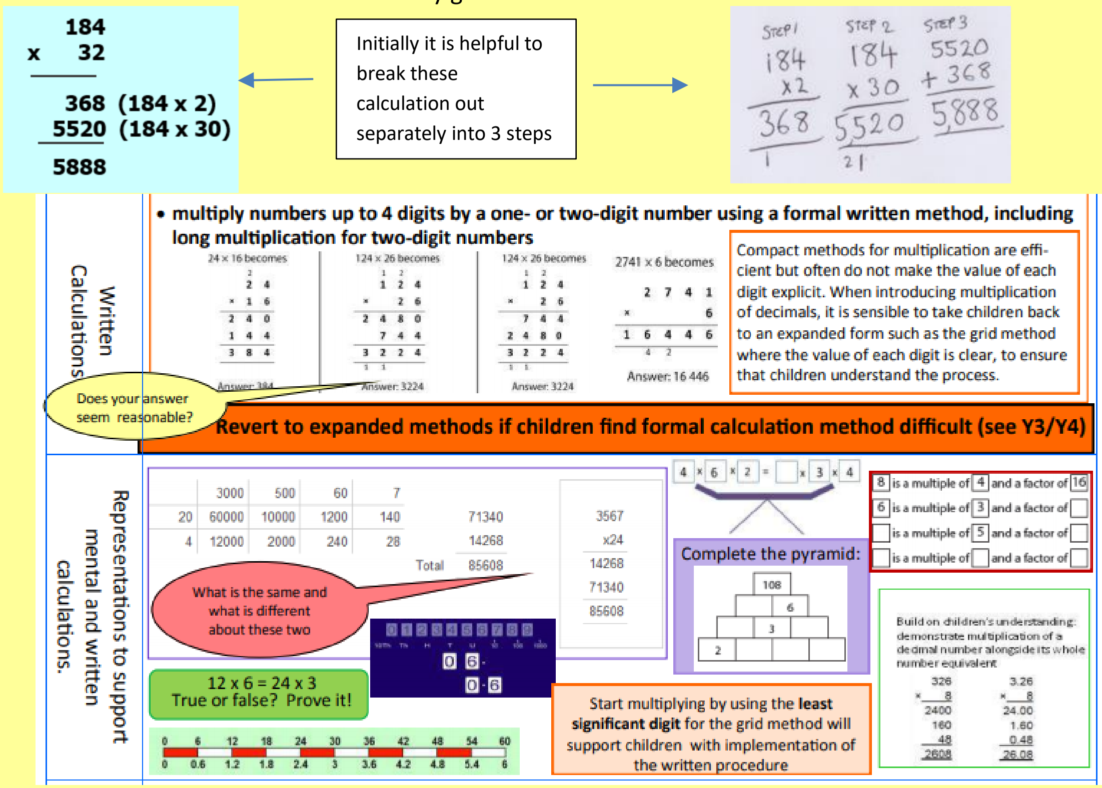
<table>
<tr><td></td><td>*Overview of LKS2*</td><td colspan="3">Children move on from dealing mainly with whole numbers to performing arithmetic operations with both decimals and fractions. They will consolidate their use of written procedures in adding and subtracting whole numbers with up to 6 digits 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.
Use number lines for calculating with time.</td></tr>
<tr><td>**Year 5**</td><td>*Addition*</td><td>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)</td><td>Use column addition to add two or three whole numbers with up to 5 digits
Use column addition to add any pair of two-place decimal numbers including amounts of money and numbers with different amounts of decimal places:


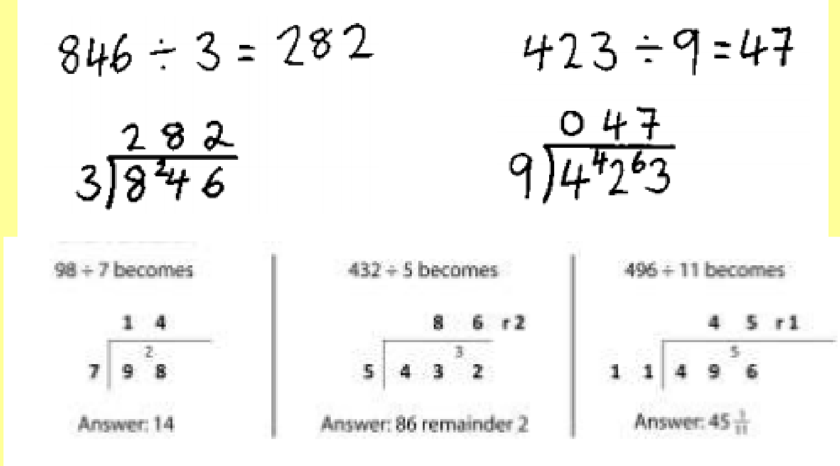
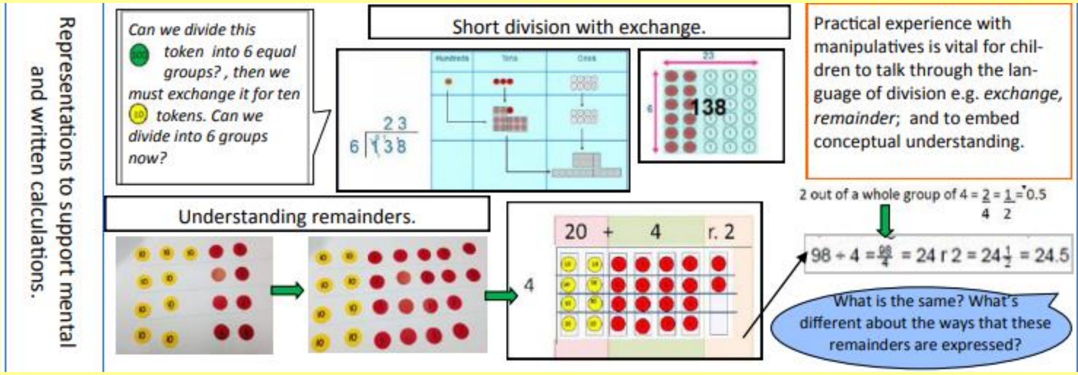


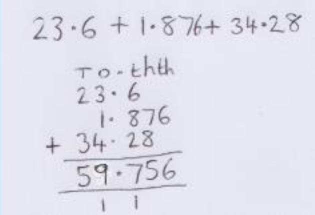
Begin to add related fractions using equivalences. (E.g. ½ + $^1/_6$ = $^3/_6$ + $^1/_6$)
Choose the most efficient method in any given situation


Use number lines for calculating with time (see Year 4 e.g.).</td><td>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</td></tr>
</table>

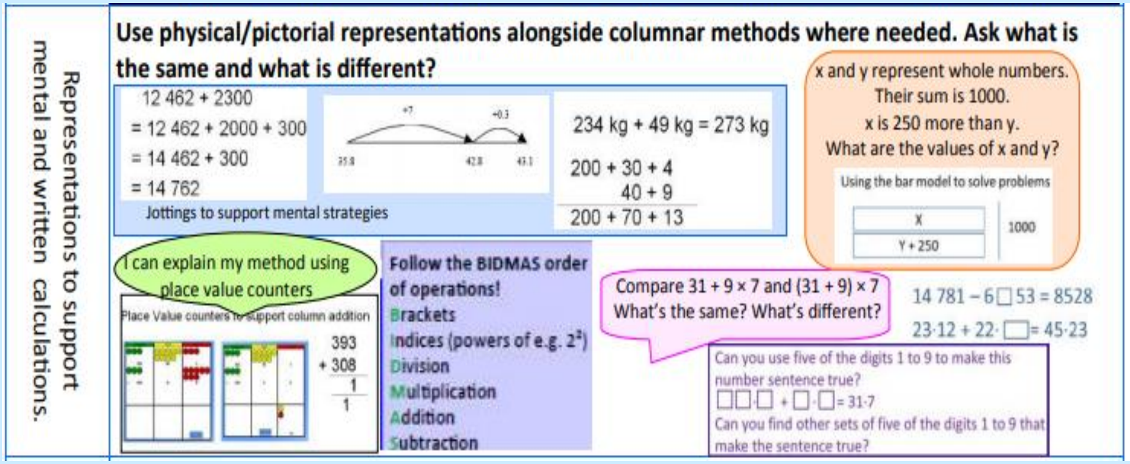
	Subtraction	Subtract numbers with two significant digits only, using mental strategies. (E.g. 6.2 – 4.5 or 72,000 – 47,000) Subtract one or two-digit multiples of 100, 1000, 10,000 and 100,000. (E.g. 8000 – 3000 or 600,000 – 200,000) Subtract one or two digit near multiples of 100, 1000, 10,000 and 100,000 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.  Consolidate columnar methods , paying particular attention to the occurrence of zeros as place holders.   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 – $^{1}/_{6}$ = $^{2}/_{6}$) Use columnar subtraction including decimals with different numbers of decimal places:  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 +3 +10 +600 = 613  2387 2390 2400 3000

	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 (e.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 11 x 11 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.

	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 10^{th} or 100^{th} 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. 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 121 ÷ 11 Divide whole numbers by 10, 100 or 1000 to give answers with up to one decimal place. Use doubling and halving as mental doubling and halving strategies Use efficient chunking to divide numbers ≤ 1000 by 1-digit numbers. Find unit fractions of 2 and 3-diigt numbers

<table>
<tr>
<td>Year 6</td>
<td>Addition</td>
<td>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</td>
<td>Use column addition to add numbers with up to 5 digits (using establishes methods from previous years).
Use column addition to add decimal numbers with up to 3-digits, including numbers with different amounts of digits in decimal places and different whole numbers:


Add mixed numbers and fractions with different denominators.

Use number lines for calculating with time. (see Year 4 e.g.)

</td>
<td>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.</td>
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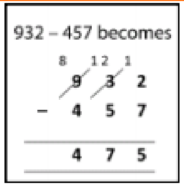
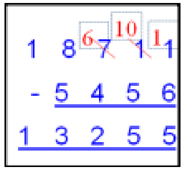
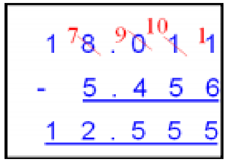
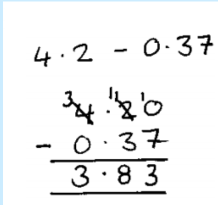
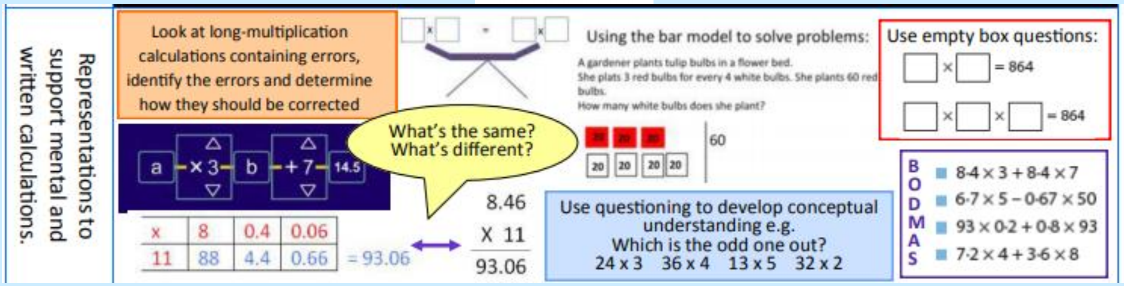
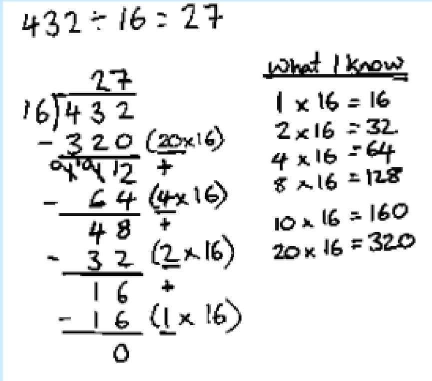
	Subtraction	Use number bonds to 100 to perform mental subtraction of any pair of integers by complementary addition. (E.g. 1000 – 654 as 46 + 300 in our heads Use number bonds to 1 and 10 to perform mental subtraction of any pair of one-place or two-place decimal numbers using complementary addition 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.  Consolidate columnar methods , paying particular attention to the occurrence of zeros as place holders.   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. Use columnar subtraction of increasing complexity, including decimals with different numbers of decimal places:  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 Use complementary addition for subtractions of one-place decimal numbers and amounts of money. (E.g. £7.30 – £3.55)

	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 Use long multiplication to multiply a 2-digit by a number with up to 4 digits Use short multiplication to multiply a 1-digit number by a number with one or two decimal places, including amounts of money. Use long multiplication to multiply whole numbers by numbers including decimals: £ 6.23 x 27 43.61 124.60 £ 168.21  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.

	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.	Consolidate all of the division work established in previous years. 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. .

Whilst this policy shows definitive formal versions of how the children should be setting out their calculations when fully-cognisant, other informal and mental methods can be used when appropriate