Calculation Policy

TUDOR PRIMARY SCHOOL

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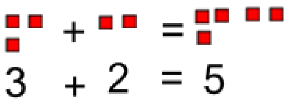
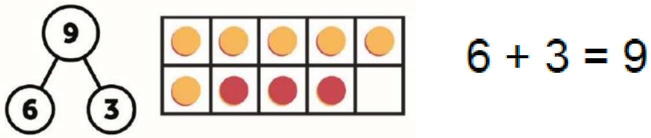
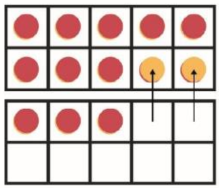
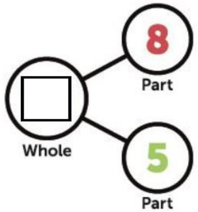
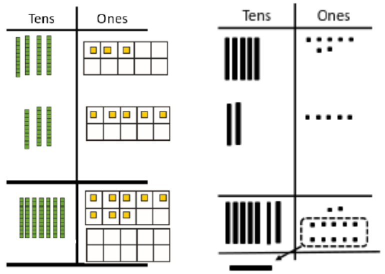
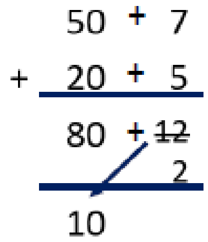
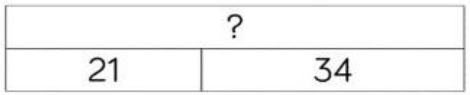
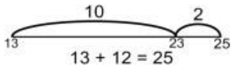
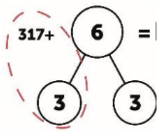
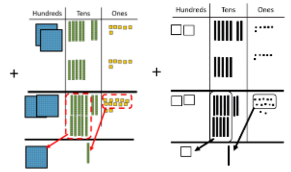
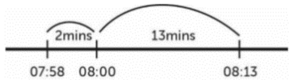
"Pure mathematics is, in its way, the poetry of logical ideas."

Albert Einstein

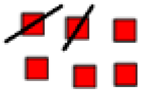
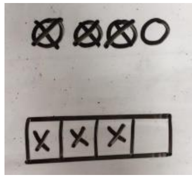
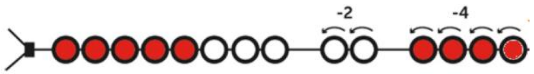
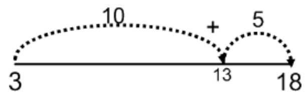
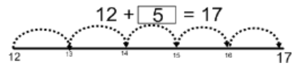
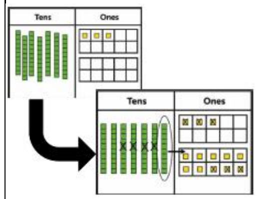
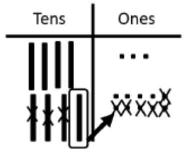
Outlined in this document are the mental and written methods employed by the teaching team at Tudor Primary School. Our intention is for these approaches to build upon prior learning, in line with the Herts Essentials Sequences. Though other strategies may be employed where appropriate, the methods defined here act as our core calculation strategies.

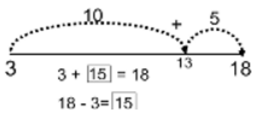
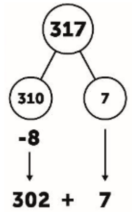
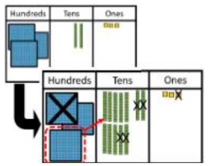
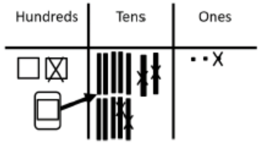
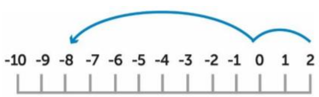
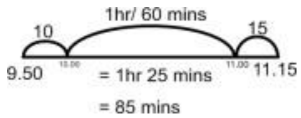
Addition

	FOUNDATION STAGE	YEAR 1	YEAR 2
Mental Methods & Skills	• Count with 1:1 correspondence • Recognise numbers • Count to 20 and beyond • Write numbers • Order numbers to 20 • Know one more than a number • Compare numbers: find 'more' • Join two groups of objects together to find the total • Count on from a given number	• Number pairs with a total of 20 e.g. 13+7 or what to add to a single digit • number to make 10, e.g. 3 +• = 10 • Addition facts for totals to at least 5, e.g. 2+3, 4+3 • Addition doubles for all numbers to at least 10, e.g. 8+8 • Add a pair of single digit numbers, e.g. 4+5 • Add a single digit number to a teens number e.g. 13+5 • Add a single digit to or from 10 and add a multiple of 10 to a single digit • number e.g. 10+7, 7+30 • Reorder numbers when adding e.g. put the larger numbers first • Count on in ones, twos or tens from largest number. • Partition small numbers e.g. 8+3=8+2+1 • Partition and combine tens and ones • Number bonds and related – facts within 20 • Missing number problems	• Number pairs with totals to 20 • All pairs of multiples of 10 with totals of up to 100 e.g. 30+70, or 60+ __= • 100 • What must be added to any two digit number to make the next multiple of • 10 e.g. 52+ □ =60 • Addition doubles for all numbers to 20 e.g. 17+17 and multiples of 10 to 50 • e.g. 40+40 • Add a pair of single digit numbers, including crossing 10, e.g. 5+8 • Add any single digit number to a multiple of 10, e.g. 60+5 • Think 10 supporting with cherry models • Add a multiple of 10 to any two digit number, e.g. 27+60 • Add 9,19,29… or 11,21,31 … • Add near doubles e.g. 13+14, 39+40 • Partition: bridge through 10 and multiples of 10 when adding • Partition and combine multiples of tens and ones • Partition: count on in tens and ones to find the total • Add two 2 digit numbers□
Written Methods& Skills	Part part whole models including pictures and number  Simple number sentences Children to use simple pictures to add e.g:  	• CPA representations leading to written number sentences  • Inverse operations recorded as number sentences ___ = 6 + 2 8 - 2 = ___ • Continued use of concrete objects and pictorial representations for missing number problems  	• Cherry models used to support partitioning of numbers. • Progress through CPA to partitioned column method.   • Bar models and Cuisenaire rods used to support inverse operations 

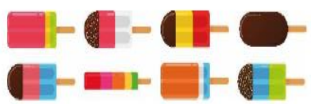
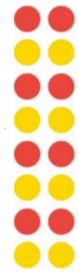
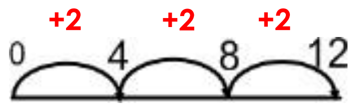
	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Mental Methods & Skills	• Add two-digit numbers e.g. 34 + 65 • Partition: add tens and ones separately, then recombine • Partition: count on in tens and ones to find the total • Partition: add 10 or 20 and adjust • Partition: count on in minutes and hours, bridging through 60 (analogue times). • Add a 3 digit number to 1/2/3 digit numbers	• Add or subtract any pair of two-digit numbers, including crossing the tens and 100 boundary, e.g. 47 + 58 • Add two-digit or three-digit multiples of 10, e.g. 140 + 150 • Partition: add a multiple of 10 and adjust e.g. 56 + 29 = 56 + 30 – 1 • Use knowledge of place value and related calculations e.g. work out 140 + 150 = 290 using 14 + 15 = 29 • Partition: count on in minutes and hours, bridging through 60 (analogue and digital times). • Partition up to 4 digits • Understand multiples of 6,7,9,25,1000	• Doubles of decimals, e.g. double 3.4 • What must be added to any four-digit number to make the next multiple of 1000, e.g. 4087 + □ = 5000 • What must be added to a decimal with units and tenths to make the next whole number, e.g. 7.2 + □ = 8 • Add a pair of two digit numbers or three digit multiples of 10 e.g. 38 - 86, 350 + 360 • Add a near multiple of 10 or 100 to any two digit or three digit number, e.g. 235 + 198 (and adjust) • Add any pairs of decimal fractions each with units and tenths e.g. 5.7 + 2.5 • Count on in hundreds, tens, ones and tenths from any number • Partition: add hundreds, tens or ones separately, then recombine • Add a multiple of 10 or 100 and adjust • Use knowledge of place value and related calculations, e.g. 6.3 + 4.8 using 63 + 48 • Partition: count on in minutes and hours, bridging through 60 (analogue and digital times)	• Addition facts for multiples of 10 to 1000 and decimal numbers with one decimal place, e.g. 650 + □ 1.4 = 2.5 • What must be added to a decimal with units, tenths and hundredths to make the next whole number e.g. 7.26 + □ = 8 • Add pairs of decimals with units, tenths or hundredths e.g. 0.7 + 3.38 • Find doubles of decimals each with units and tenths e.g. 1.6 + 1.6 • Add near doubles of decimals e.g. 2.5 + 2.6 • Add a decimal with units and tenths, that is nearly a whole number e.g. 4.3 + 2.9 • Count on in hundreds, tens, ones, tenths and hundredths • Use knowledge of place value and related calculations e.g. 680 + 430, 6.8 + 4.3, 0.68 + 0.43 can all be worked out using the related calculation 68 + 43 • Partition: add a whole number and adjust e.g. 4.3 + 2.9 = 4.3 + 3 – 0.1 • Partition: count on in minutes and hours, bridging through 60 (analogue and digital times, 12 hour and 24 hour clock)
Written Methods & Skills	Children to develop use of number lines and cherry models. Different methods relate to: Adding on 'partitioned' numbers e.g.  Adding using knowledge of number bonds to regroup numbers.  Progress through CPA to formal column method.  $\begin{array}{r} 2\ 7\ 6 \\ +\ \ \ 5\ 6 \\ \hline 3\ 3\ 2 \\ \hline 1\ 1\ \ \end{array}$	Develop the partition approach as highlighted in year 3 to larger numbers. (Hundreds/tens/ones) Develop the number line method highlighted in year 3 to larger numbers, especially in certain contexts .e.g time.  Embed formal column addition to use of **4 digits** once understanding of place value has been embedded through CPA and revision of Year 3 learning. ENSURE children understand the place value reasoning behind the carrying. e.g- 5 + 8 = 13 = 1 ten and 3 ones. $\begin{array}{r} 3\ 7\ 9\ 7 \\ +\ 3\ 4\ 3\ 5 \\ \hline \\ \hline \end{array}$	Number line methods to be built upon when adding as part of time problems and when using negative numbers (bridging 0)  Use CPA to extend column method to larger numbers as well as introducing decimals. e.g: $\begin{array}{r} 128.7 \\ +\ 33.9 \\ \hline 162{\cdot}6 \\ 1\ 1\ \ \end{array}$ Partition of decimals to be taught: **8.5 + 5.9 = 13 + 1.4= 14.4**	Consolidate and extend written approaches and teach children to use the most effective strategy when dealing with different problems. Continue to encourage drawings/ diagrams/ pictures when solving complex problems. Partition of decimals to be extended to 'thousands': 0.7 + 3.38 = 3 + =3 0.7 + 0.3 = 1 0.08 = 0.08 = 4.08 At all times, effective rounding/ estimation of the addition is important here. Teaching of algebra: Can start from- 6 + X = 10 Progress to multi- step problems involving algebraic language.

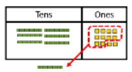
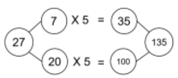
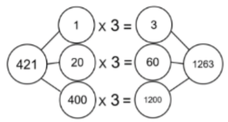
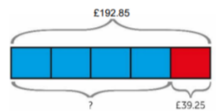
Subtraction

	FOUNDATION STAGE	YEAR 1	YEAR 2
Mental Methods & Skills	• Count backwards from 10 to 0 • Count backwards from 20 – 0 • Number rhymes on songs, counting back in ones i.e. 10 green bottles • Know one less • Use objects to make smaller amounts • Use objects to 'take away'	• Subtract a pair of single-digit numbers e.g. 8 – 3 • Subtract a single-digit number from a teens numbers e.g. 17 – 3 • Subtract a single-digit from 10 or 20 • Count back in ones, two or tens • Partition small numbers e.g. 8 – 3 = 8 – 2 – 1 • Know one less • Know largest and smallest number • Count back from any number to 50 • Practical strategies to see 'difference' to see how many more are needed to make a bigger number • Know by heart subtraction facts to 10 and 20	• Subtraction facts for all numbers up to at least 20 e.g. 8 – 5 • Using cherry models, what must be subtracted from any two-digit number to make the next multiple of 10 e.g. 52 - ?= 50 • Know largest number comes first when subtracting • Partition: bridge through 10 and multiples of 10 when subtracting • Partition: count on or back in tens and ones to find the difference • Know halves of numbers to 20 • Subtract a single-digit number from a two-digit number, including crossing the tens boundary e.g. 57 – 3, 52 – 7, 37 – 12 = 37 – 10 – 2 • Subtract a multiple of 10 from any two-digit number e.g. 72 – 50 • Use rebalancing to subtract 9, 19, 29 ..... or 11, 21, 31 ..., subtracting a multiple of 10 and adjusting • Subtract any single-digit number from a multiple of 10 e.g. 80 – 7 • Subtract a pair of single-digit numbers, including crossing 10 e.g. 12 – 7 • Subtract a 2 digit number from a 2 digit number
Written Methods & Skills	Simple linear number sentences, e.g: 5 - 2 = Use of pictures/ crossings out to model the subtraction, e.g: 6 - 2= 4 	Extend the linear number sentences to larger numbers (under 20). Use diagrams to illustrate problem and cross out to show the part/s being subtracted.  Children to use concrete objects/ pictorial representations for missing number problems. __ - 6 = 8 	Children able to use empty number lines to find differences Also, extend idea of counting back to showing the difference by 'counting on'.   CPA progression through to expanded column method, including exchanging when necessary:   60 13 ~~70~~ + ~~3~~ - 40 + 6 20 + 7

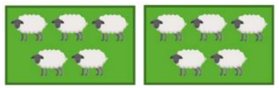
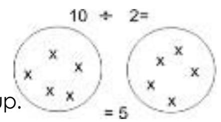
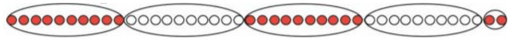
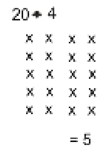
	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Mental Methods & Skills	• Subtract a two-digit number from a multiple of 10 e.g., 90 – 27 • Subtract two-digit numbers e.g. 68 – 35 • Subtract by counting up from the smallest number to the largest number • Partition: count back in tens and ones to find the difference • Partition: subtract 10 or 20 and adjust • 3 digit numbers and 2/3 digit numbers	• Count back in hundreds, tens and ones • Partition: subtract tens and then ones e.g. subtracting 27 by subtracting 20 then 7. • Subtract by counting up from the smaller to the larger number • Partition: subtract a multiple of 10 and adjust e.g. 86 – 38 = 86 – 40 +2 • Use knowledge of place value and related calculations e.g. work out 290 – 150 = 140 because 29-15=14 • Partition: count back in minutes and hours, bridging through 60 (analogue and digital times) • Subtract any pair of two-digit numbers, including crossing the tens and 100 boundary e.g. 91 – 35 • Subtract two-digit or three-digit multiples of 10 e.g. 120 – 40, 370 – 180 • Work up to 4 digits	• Count back in hundreds, tens, ones and tenths • Subtract by counting up from the smaller to the larger number • Subtract a multiple of 10 or 100 and adjust • Use knowledge of place value and related calculations e.g. 6.3 – 4.8 using 63 – 48 • Partition: count back in minutes and hours, bridging through 60 (analogue and digital times) • Subtract a pair of two-digit numbers or three- digit multiples of 10 e.g. 620 – 380 • Subtract a near multiple of 10 or 100 to any two-digit or three-digit number e.g. 235 – 198 • Find the difference between near multiples of 100 e.g. 607 – 588 or of 1000 e.g. 6070 – 4087 • Subtract any pairs of decimal fractions each with units and tenths e.g. 6.3 – 4.8 • Differences of decimals e.g. 7.8 – 1.3 • Doubles and halves of decimals e.g. half of 5.6, double 3.4 • Work up to 4 digits and more	• Count back in hundreds, tens, ones, tenths and hundredths • Use knowledge of place value and related calculations e.g. 111 – 68 = 43 can be worked out using the related calculation 1.11 – 0.68 = 0.43 • Partition: subtract a whole number and adjust e.g. 6.5 – 3.8 = 6.5 – 4 + 0.2 • Partition: count back in minutes and hours, bridging through 60 (analogue and digital times, 12 hour and 24 hour clock) • Subtraction facts for multiples of 10 to 1000 and decimal numbers with one decimal place e.g. ? – 1.4 = 2.5 • What must be added to a decimal with Ones, tenths and hundredths to make the next whole number e.g. 7.26 + ? = 8 TO SOLVE 8 – 7.26 • Subtract a decimal with Ones and tenths, that is nearly a whole number e.g. 6.5 – 3.8 • Subtract pairs of decimals with Ones, tenths or hundredths e.g. 3.38 – 0.7
Written Methods & Skills	Develop and extend use of number lines and cherry models to show difference. Using partitioning:  Bridging:  Progress through CPA to formal column method:  $\overset{2}{\cancel{3}}\ {}^{1}2\ \ 3$ $-\ 1\ \ 4\ \ 1$ $1\ \ 8\ \ 2$ 	Develop use (and UNDERSTANDING) of formal column method. Extend to 4 digits. Extend use of number lines to support calculation in time.  Numberlines to be used to support solving problems with negative numbers. 	Use of CPA to extend the written column method with use of decimals. Include examples with 'multiple exchanges' across place value columns: $8\,\overset{2}{\cancel{3}}\,{}^{1}\overset{2}{\cancel{3}}\,.\,{}^{1}5$ $-\ 123.8$ 709.7 Highlight efficiency of different strategies including when other methods may be more appropriate. For example, with 100-99, it would make more sense to count on 1 rather than complete all the written working. Teach differences in time using number lines, e.g 	Develop and extend all of the previous methods and teach children to use an efficient method for different problems. Ensure clear understanding is maintained when using decimals. Especially with column subtraction. Teach how to use additional zeroes as place holders until the decimal place value is the same for both of the numbers, e.g ${}^{6}\cancel{7}\,{}^{1}5\cdot\overset{3}{\cancel{4}}\,{}^{1}0$ $-48\cdot38$ $27\cdot02$

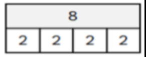
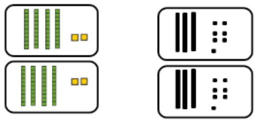
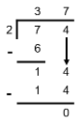
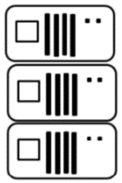
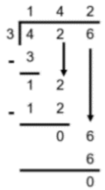
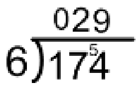
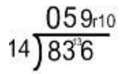
Multiplication

	FOUNDATION STAGE	YEAR 1	YEAR 2
Mental Methods & Skills	• Counting in ones and twos • Doubling numbers to 5 e.g. double 3 • Even and odd numbers to 10.	• Count on from and back to zero in ones, twos, fives or tens • Doubles of all numbers to 10, e.g. double 6 • Odd and even numbers to 20 • Use patterns of last digits e.g. 0 and 5 when counting in fives. • Think of multiplication as repeated addition e.g. 2+2+2+2 or 5+5+5 or 10p + 10p + 10p +10p • Odd and even numbers to 100	• Doubles of all numbers to 20 e.g. double 13, and corresponding halves. • Doubles of multiples of 10 to 50 e.g. double 40 and corresponding halves. • Multiplication facts for the 2, 5 and 10 times-tables, and corresponding division facts • Double any multiple of 5 up to 50 e.g. double 35 • Find the total number of objects when they are organised into groups of 2, 5 or 10. • Understand multiplication as a) repeated addition b) arrays • Partition: double the tens and ones separately, then recombine • Use knowledge that doubling is equivalent to multiplying by two. • Use knowledge of multiplication facts from the 2, 5 and 10 times tables e.g. recognise that there are 15 objects altogether because there are three groups of five. • Know multiplication can be done in any order (Commutative law) • Know how to represent arrays on a number line.
Written Methods & Skills	N/A – Reception children to physical methods to explore multiplication and division	Use of informal methods when counting groups of items. (Pictures/ toys/ arrays) How many toys altogether?  2 + 2 + 2 + 2 = 8 x x x x x x x x =8	Use of arrays to provide visual representation of multiplying groups of a number. Array can be shown using different symbols. Squares can be used to help organise the working. **8 x 2 = 16**  Highlight link to repeated addition. 

	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Mental Methods &kills	• Multiplication facts for the 2,3,4,5,8 and 10 times tables and corresponding division facts. • Know associative law i.e. 6 x 4 = 6 x (2x2) • Know distributive law i.e. 5 x 6 = (5x2) + (5x4) • Multiply one digit or two-digit numbers by 10 or 100 e.g. 7 x 100, 46 x 10, 54 x 100 • Recognise that when multiplying by 10 or 100 the digits move one or two places to the left and zero is used as a place holder.	• Multiplication facts 6to 10 x 10 and the corresponding division facts. • Doubles of numbers 1 to 100 e.g. double 58 and corresponding halves. • Factor pairs for known multiplication facts. • Double any two-digit number e.g. double 39. • Multiply a multiple of 10 to 100 by a single-digit number e.g. 40 x 3. • Multiply numbers to 20 by a single-digit e.g. 17 x 3 using partitioning. • Multiply numbers to 1000 by 10 and then 100 (whole-number answers) e.g. 325 x 10, 42 x 100 • Partition: double the tens and ones separately, then recombine. • Use understanding that when a number is multiplied or divided by 10 or 100 its digits move one or two places to the left or the right and zero is used as a place holder. • Use knowledge of multiplication facts and place value e.g. 7 x 8 = 56 to find 70 x 8, 7 x 80. • Use partitioning and the distributive law to multiply e.g. 13 x 4 = (10 + 3) x 4 = (10 x 4) + (3 x 4) = 40 + 12 = 52 • Find unit fractions and simple non-unit fractions of numbers and quantities e.g. ⅜ of 24 by ÷ 8 x 3	• Squares to 10 x 10 • Multiply whole numbers and decimals by 10, 100 or 1000 e.g. 4.3 x 10, 0.75 x 100. • Multiply pairs of multiples of 10 e.g. 60 x 30 and a multiple of 100 by a single digit number e.g. 900 x 8. • Find fractions of whole numbers or quantities e.g. 2/3 of 27, 4/5 of 70 kg using ÷ and x. • Find factor pairs for numbers to 100, e.g. 30, 2 x 15, 3 x 10 and 5 x 6. • Be able to choose an efficient method • Multiply two-digit numbers by 4 or 8 e.g. 26 x 4 by repeated doubling. • Multiply two-digit numbers by 5 or 20 e.g. 320 x 5, 14 x 20 i.e. to x by 5, x by 10 and half or x 20 is x 10 and double. • Multiply by 25 and 50 e.g. 48 x 25, 32 x 50. • Double three-digit multiples of 10 to 500 e.g. 380 x 2. • Use knowledge of doubles and understanding of place value e.g. when multiplying by 50 multiply by 100 and divide by 2. • Use understanding that when a number is multiplied or divided by 10 or 100, its digits move one or two places to the left relative to the decimal point and zero is used as a place holder. • Prime numbers to 19 • Multiply 4 digit by 1 or 2 digits mentally when appropriate	• Square numbers to 12 x 12 • Squares of the corresponding multiples of 10 • Prime numbers less than 100 • Identify numbers with odd and even numbers of factors and no factor pairs other than 1 and themselves. • Use knowledge of multiplication and division facts to identify factor pairs and numbers with only two factors. • Multiply pairs of two-digit and single-digit numbers e.g. 28 x 3 • Double decimals with units and tenths e.g. double 7.6 • Multiply decimals by 10 or 100 and understand its digits move one or two places to the left relative to the decimal point and that zero is one place holder i.e. 0.078 x 100 = 7.8 • Multiply pairs of multiples of 10 and 100 e.g. 50 x 30, 600 x 20 • Multiply two-digit decimals such as 0.8 x 7 • Recognise how to scale up or down using multiplication and division e.g. if three oranges cost 24p One orange costs 24 ÷ 3 = 8p Four oranges cost 8 x 4 = 32p • Find 10% or multiples of 10% of numbers and quantities i.e. 70% of 200 g • Understand 'powers' • Be able to choose an efficient method. • Multiply integers by fractions • Solve multiplications with brackets
Written Methods & Skills	Show repeated addition using bar model. 8 2 | 2 | 2 | 2 Ensure clear understanding of place value. Highlight effect of x by 10. This does NOT just mean add a zero. Teach the EFFECT it has on the original number. Introduce simple grid methods for organising partition approaches to multiplication. Eg 17 x 8= 10 x 8 add 7 x 8: x | 10 | 7 8 | 80 | 56 80 +56 136 Progress through CPA to formal column method.   2 7 x 5 1 3 5 3	Begin to develop written jottings of 'mental manipulation' of multiplication: e.g 16 x 4= 8 x 8 16 x 4 = 8 x 8 ÷2 x2 Teach when appropriate to manipulate the numbers. Build upon CPA from Year 3, progressing to multiplying larger numbers and regrouping as appropriate.  4 2 1 x 3 1 2 6 3	Build on previous CPA to develop formal written approaches to 4 digits x 2 digits. Highlight importance of zero as a place holder when multiplying by a 2-digit number in order for subsequent mental calculations to give correct products. 4 3 4 x 1 2 8 6 8 4 3 4 0 5 2 0 8 1 1 Continue to extend written jottings in support of mental methods- partitioning/ number manipulation, etc. e.g- partitioning of decimals using base multiplication facts. **7 x 8.5 = 56 + 3.5 = 59.5** When a number contains a decimal, teach how to manipulate the number before multiplying to find the product.	Extend previous written methods (formal and informal), for use when solving more complex problems, including numbers containing decimals. 3 4 • 2 x 6 2 ²0 ¹5 • 2 Continue to encourage drawings/diagrams/ pictures when solving complex problems.   Encourage 'adjustment' of the original numbers by x by 10/100 etc to remove decimals & then inverse to find solution. At all times, effective rounding/ estimation of the multiplication is important here. More developed partition may be appropriate- e.g 17 x 8 = 20 x 8 minus 3 x 8 BUT children should be encouraged to work positively(use of addition whenever they can- e.g 17 x 8= 10 x 8 add 7 x 8)

Division

	FOUNDATION STAGE	YEAR 1	YEAR 2
Mental Methods & Skills	• Share toys/counting equipment between 2 or 3 • Count to check each group has the same • Put apparatus into groups of two, three, four or five • Notice when groups of objects are 'the same' • Share objects using '1 for you' '1 for you' between bags, plates, bowls, hoops etc. • Cut objects and shapes in half with knives and scissors.	• Share toys/counting equipment between 2 or 3 • Count to check each group has the same • Put apparatus into groups of two, five or 10 • Notice when groups of objects are 'the same' • Share objects using '1 for you' '1 for you' between bags, plates, bowls, hoops etc. • Cut objects and shapes in half with knives and scissors. • Count back in ones, twos, fives and tens. • Halves of all numbers to 10 • Begin to know halves of numbers to 20 • Know when we share we get 'less' • Odd/even numbers • Understand division as sharing (one for you) and grouping. • Cut shapes, pieces of string, card in half • Compare two halves and see that they are exactly the same.	• Share toys/counting equipment between 2 or 3 • Count to check each group has the same • Put apparatus into groups of two, three, four or five • Notice when groups of objects are 'the same' • Share objects using '1 for you' '1 for you' between bags, plates, bowls, hoops etc. • Cut objects and shapes in half with knives and scissors. • Count back in ones, twos, fives and tens. • Know halves of numbers to 20 • Know when we share we get 'less' • Odd/even numbers • Understand division as sharing (one for you) and grouping. • Cut shapes, pieces of string, card in half • Compare two halves and see that they are exactly the same. • Halves of multiples of 10 to 100 • Division facts for 2, 5, 10 x tables • Odd and even numbers to 100 • Find half of even numbers to 40 • Use knowledge that halving is the inverse of doubling • Put an odd number of objects into groups of 2 and see what's 'left over' • Know/understand division as repeated subtraction • Understand division as sharing (one for you) and grouping. • Understand division as grouping through arrays.
Written Methods & Skills	N/A – Reception children to physical methods to explore multiplication and division	Use of informal methods when counting and grouping item. (Pictures/ toys/ etc)   How many toys in each circle/ group. X X X X X X X X X X = **2** lots of 5	Use sharing circles to share objects equally.  Finding how many are left over. Refer to this as the remainder. Splitting an amount into different groups. Show grouping out initially as repeated subtraction:  Use of arrays to provide visual representation of dividing groups of a number. Arrays can be shown using different symbols. Squares can be used to help organise the working. Highlight link to repeated addition/mulplication. 

	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Mental Methods & Skills	• Find unit fractions of numbers and quantities involving halves, thirds, quarters, fifths and tenths i.e. find 1/5 by dividing by 5 • Multiplication facts for the 2, 3, 4, 5, 8 and 10 times-tables and corresponding division facts. • Use knowledge of multiples to find quotients i.e. 15 ÷ 3 = 5 because there are five threes in fifteen. • Recognise that finding a unit fraction is equivalent to dividing by the denominator and use knowledge of division facts. • Recognise that when dividing by 10 or 100 the digits move one or two places to the right and zero is used as a place holder. • Know there will be 'left overs' if you have a number that is not a multiple of the divisor.	• Multiplication facts to 12 x 12 and the corresponding division facts. • Fraction and decimal equivalents of one-half, quarter, tenths and hundredths e.g. 3/10 is 0.3 and 3/100 is 0.03 • Partition: halve the tens and ones separately, then recombine. • Use understanding that when a number is divided by 10 or 100, its digits move one or two places to the right and zero is used as a place holder. • Choose an efficient method • Begin to use knowledge of multiplication facts and place value e.g. 56 ÷ 8 = 7 so 560 ÷8 = 70 • Halve any even numbers to 200. • Find unit fractions and simple non-unit fractions of numbers and quantities e.g. ⅜ of 24 • Divide numbers to 1000 by 10 and then 100 (whole number answers) e.g. 120 ÷ 10, 600 ÷ 100, 850 ÷ 10 • Identify the remainder when dividing by 2, 5, 10 • Give the factor pair associated with a multiplication fact e.g. identify that if 2 x 3 = 6 then 6 has the factor pair 2 and 3.	• Division facts corresponding to tables up to 10 x 10 and the related unit fractions e.g. 7 x 9 = 63 so one-ninth of 63 is 7 and one-seventh of 63 is 9. • Percentage equivalents of one-half, one-quarter, three-quarters, tenths and hundredths. • Factor pairs to 100 • Divide by 4 or 8 by repeated halving, or 5 &10. • Form an equivalent calculation e.g. to multiply by 5, multiply by 10 then halve, to multiply by 20, double, then multiply by 10. • Use knowledge of doubles/halves and understanding of place value e.g. when multiplying by 50 multiply by 100 and divide by 2. • Find fractions of whole numbers of quantities e.g. 2/3 of 27, 4/5 of 70 kg • Find 50%, 25% or 10% of whole numbers or quantities e.g. 25% of 20 kg, 10% of £80. • Use understanding that when a number is divided by 10 or 100 its digits move one or two places to the right relative to the decimal point, and zero is used as a place holder. • Use knowledge of multiplication and division facts and understanding of place value e.g. when calculating with multiples of 10 i.e. 760 ÷ 2. • Use knowledge of equivalence between fractions & percentages e.g. to find 50%,25%,10% • Use knowledge of multiplication and division facts to find factor pairs. • Find the remainder after dividing a two digit number by a single-digit number e.g.27 ÷ 4 = 6 R 3. • Divide a multiple of 10 by a single-digit number (whole number answers) e.g. 80 ÷ 4, 270 ÷ 3. • Choose an efficient method.	• Equivalent fractions, decimals and percentages for hundredths e.g. 35% is equivalent to 0.35 or 35/100 • Partition: use partitioning and the distributive law to divide tens and ones separately e.g. 92 ÷ 4 = (80 +12) ÷ 4 = 20 + 3 = 23 • Form an equivalent calculation e.g. to divide by 25 divide by 100 then multiply by 4; to divide by 50 divide by 100 then double. • Use knowledge of the equivalence between fractions and percentages and the relationship between fractions and division. • Recognise how to scale down using division e.g. if three oranges cost 24p one orange costs 24 ÷ 3 = 8p • Converting a remainder to a decimal/fraction in context. • Choose an efficient method. • Divide a two-digit number by a single digit number e.g. 68 ÷ 4 • Divide by 25 or 50 e.g. 480 ÷ 25, 3200 ÷ 50. • Double decimals with units and tenths e.g. double 7.6 and find the corresponding halves e.g. half of 15.2 • Divide multiples of 100 by a multiple of 10 or 100 (whole number answers) e.g. 600 ÷ 20, 800 ÷ 400, 2100 ÷ 300 • Find 10% or multiples of 10%, of whole numbers and quantities e.g. 30% of 50 ml, 40% of £30, 70% of 200 g. • Simplify fractions by cancelling. • Identify numbers with odd & even numbers of factors & no factor pairs other than 1 & themselves.
Written Methods & Skills	Show repeated addition using bar model, highlighting equal groups.  Relating arrays back to bar models, teach how an array can show the related division/ multiplication facts:  4x5/5x4 20÷5=4/20÷4=5 Progress through CPA to formal 'bus stop' method. 	Progress through CPA to long division using 'chunking' of larger numbers.  Bus stop (short division) can then begin to be introduced once clear understanding of the division process has been cemented. 	Children to recognize how to deal with remainders dependent on scenario. For example: **178 ÷ 6 =** **As a remainder- 29 r 4** **As a fraction- 29 4/6** **As a decimal - 26.67 (to 2 decimal places)** Progress through CPA so formal bus stop method of division is developed as appropriate.  Children to be encouraged to highlight their wider understanding of number. Use of multiplication base facts when approaching the division problem. E.g. : for 174 ÷ 6- I KNOW 30 x 6 = 180. I THEN know 29 x 6 = 174.	Extend previous written methods (formal and informal), for use when solving more complex problems. When wanting to use bus stop division with numbers over 10, model how to quickly write the related number sequence (use of jottings) at the side:  14 28 42 56 70 84 98 112 126 140 Continue to encourage drawings/ diagrams/ pictures when solving complex problems. Encourage 'adjustment' of the original numbers by x by 10/100 etc to remove decimals and then inverse to find solution. At all times, effective rounding/ estimation of the division is important here.