Mathematical Calculation Policy

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This policy contains the key pencil and paper procedures that will be taught within our school. It has been written to ensure consistency and progression throughout the school and to provide a framework for professional discussion about how we can provide the very best mathematics teaching for all our pupils.

Although the focus of the policy is on pencil and paper procedures it is important to recognise that the ability to calculate mentally lies at the heart of the very best mathematical learning. Mental skills will be taught systematically from Nursery onwards and pupils will be given regular opportunities to develop the necessary skills. However mental calculation is not at the exclusion of written recording and should be seen as complementary to and not as separate from it. In every written method there is an element of mental processing. Sharing written methods with the teacher encourages children to think about the mental strategies that underpin them and to develop new ideas. Therefore written recording both helps children to clarify their thinking and supports and extends the development of more fluent and sophisticated mental strategies. At Avalon we encourage our pupils to develop their own use of informal jottings and drawings as a precursor to introducing them to standard formal methods. This helps them to make links between their own understanding of number and the formal methods, and aids confidence.

During their time at Avalon children will be encouraged to see mathematics as both a written and spoken language. Teachers will support and guide children through the following important Level s:

1) Developing the use of pictures and a mixture of words and symbols to represent numerical activities
2) Use of jottings to aid a mental strategy
3) Use of pencil and paper procedures
4) Use of a calculator

The policy concentrates on the introduction of standard symbols, the use of the empty number line as a jotting to aid mental calculation and on the introduction of pencil and paper procedures. It is important that children do not abandon jottings and mental methods once pencil and paper procedures are introduced. Therefore children will always be encouraged to look at a calculation/problem and then decide which is the best method to choose – pictures, mental calculation with or without jottings, structured recording or a calculator.

Reasons for using written methods

- To aid mental calculation by writing down some of the numbers and answers involved
- To make clear a mental procedure for the pupil
- To help communicate methods and solutions
- To provide a record of work to be done
- To aid calculation when the problem is too difficult to be done mentally
- To develop and refine a set of rules for calculations

When are children ready for written calculations

Addition and subtraction

- Do they know addition and subtraction facts to 20?
- Do they understand place value and can they partition numbers?
- Can they add three single digit numbers mentally?
- Can they add and subtract any pair of two digit numbers mentally?
- Can they explain their mental strategies orally and record them using informal jottings?

Multiplication and division

- Do they know the 2, 3, 4, 5 and 10 time table
- Do they know the result of multiplying by 0 and 1?
- Do they understand 0 as a place holder?
- Can they multiply two and three digit numbers by 10 and 100?
- Can they double and halve two digit numbers mentally?
- Can they use multiplication facts they know to derive mentally other multiplication facts that they do not know?
- Can they explain their mental strategies orally and record them using informal jottings?

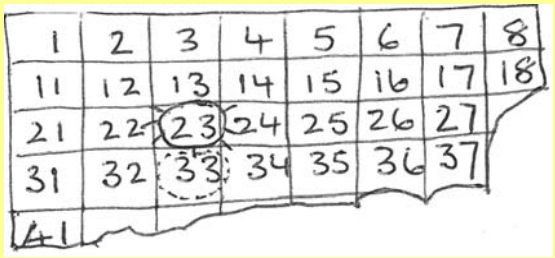
The previous lists are not exhaustive but are a guide for the teacher to judge when a child is ready to move from informal to formal methods of calculation.

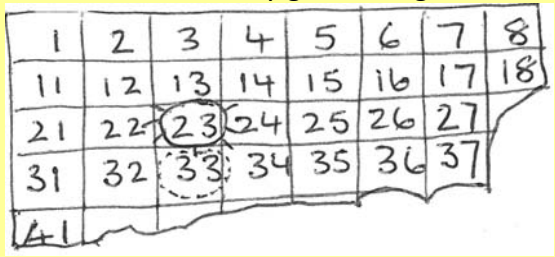
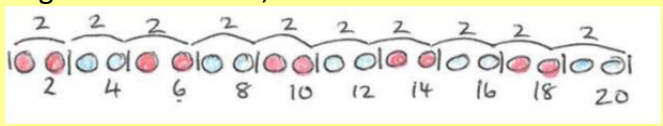
Levels

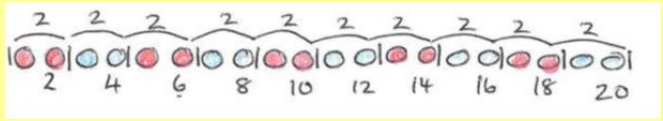
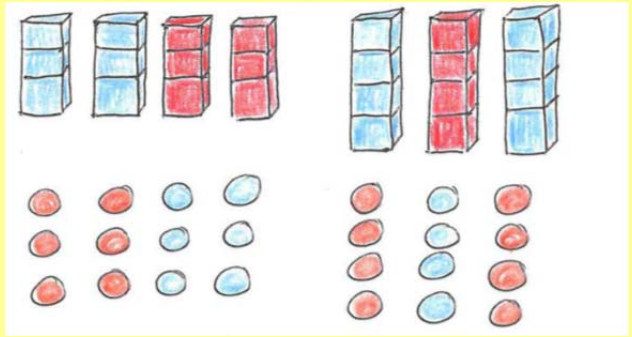
The calculation policy has been produced for individual classes for guidance as to what is to be taught. It is perfectly acceptable to assume that some children could move levels, up or down regardless of their Key Level . This will depend on children's individual needs. The levelled process means that children can progress at their own speed. Teachers should use their judgment as to when to introduce the next level as the expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next Level . **Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content.** Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Key Stage 1

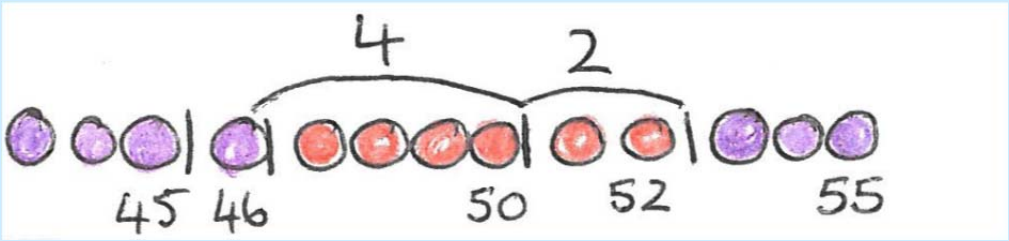
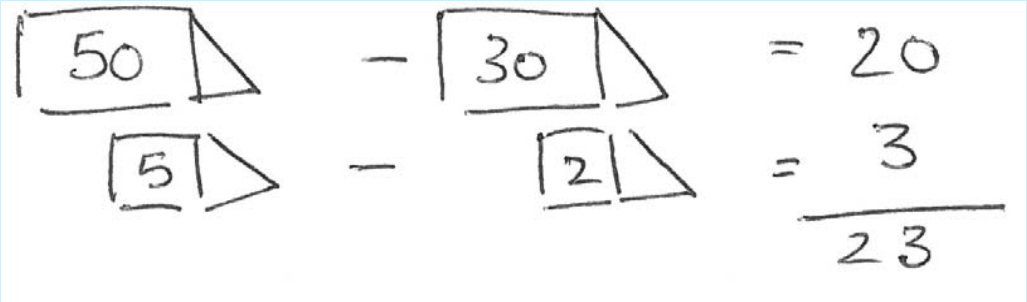
		Mental calculation	Written Calculation	Default for ALL children
	Overview of KS1	Children in Years 1 and 2 will be given a really solid foundation in the basic building blocks of mental and written arithmetic. Through being taught place value, they will develop an understanding of how numbers work, so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

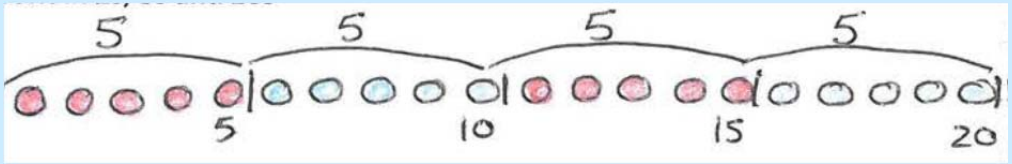
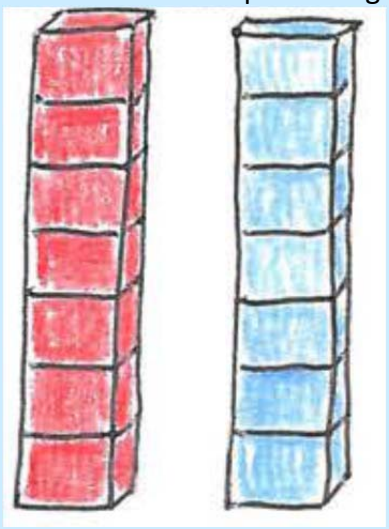
		Mental calculation	Written Calculation	Default for ALL children
Level 1	***Addition***	• Number bonds ('story of' 5, 6, 7, 8, 9 and 10) • *(eg 3 + 2 = 5, 1 + 4 = 5 etc)* • Count on in ones from a given 2-digit number • Add two single-digit numbers • Add three single-digit numbers spotting doubles or pairs to 10 • Count on in tens from any given 2-digit number • Add 10 to any given 2-digit number *eg knowing 23 + 10 = 33 using a number square*  • Use number facts to add single-digit numbers to two-digit numbers*, e.g. use 4 + 3 to work out 24 + 3, 34 + 3…* • <u>Add by putting the larger number first</u>		Pairs with a total of 10 Counting in ones Counting in tens Count on 1 from any given 2-digit number

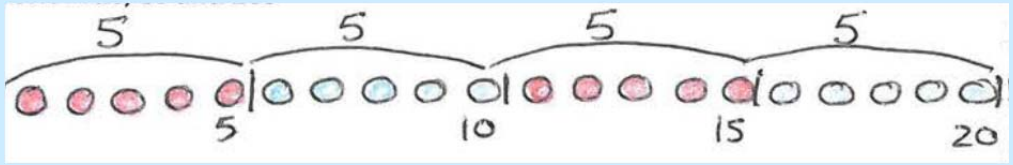
		Mental calculation	Written Calculation	Default for ALL children
	Subtraction	• Number bonds ('story of' 5, 6, 7, 8, 9 and 10) • Count back in ones from a given 2-digit number • Subtract one single-digit number from another • Count back in tens from any given 2-digit number • Subtract 10 from any given 2-digit number *eg 33 – 10 = 23* •  • 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
	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		• Begin to count in 2s and 10s • Double numbers to 5 using fingers

		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 <u>hard to halve odd numbers</u> • 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. • 		• Begin to count in 2s and 10s • Find half of even numbers by sharing

		Mental calculation	Written Calculation	Default for ALL children
Level 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 • Use partitioning for larger numbers eg 55 + 37 		• 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

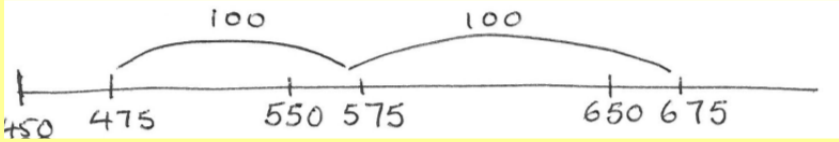
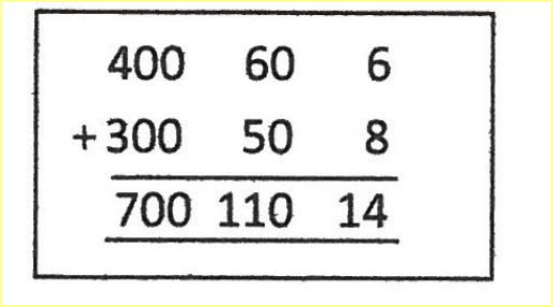
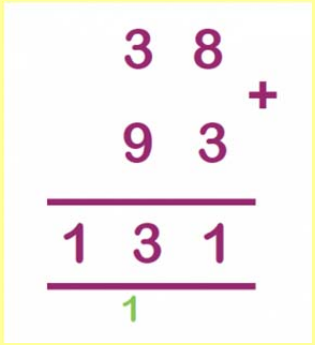
		Mental calculation	Written Calculation	Default for ALL children
	Subtraction	• Number bonds – knowing all the pairs of numbers which make all the numbers to 12 • Count back in ones and tens from any given 2-digit number • Subtract a single-digit number from any 2-digit number using number facts, including bridging multiples of 10, e.g. 56 – 3, 53 – 5. • *Bridging numbers can be done in jumps eg 52 – 6 is 52 – 2, then take away 4*  • 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. • Use partitioning eg 55 – 32 is split into  		• 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

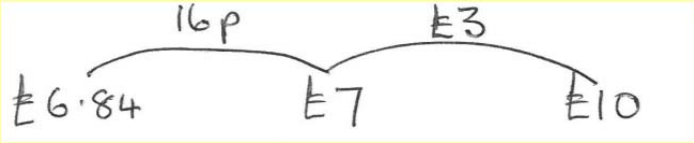
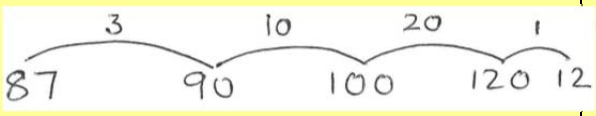
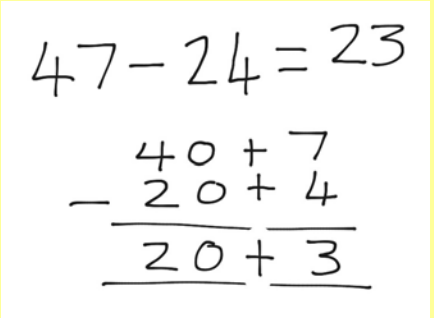
		Mental calculation	Written Calculation	Default for ALL children
	Multiplication	Count in 2s, 5s and 10s  Begin to count in 3s. Begin to understand that multiplication is repeated addition and to use arrays (E.g. 3 x 4 is three rows of 4 dots) Begin to learn the 2x, 3x, 5x and 10x tables, seeing these as 'lots of', e.g. 5 lots of 2, 6 lots of 2, 7 lots of 2, etc. Double numbers up to 20 eg knowing double 7 = 14  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		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

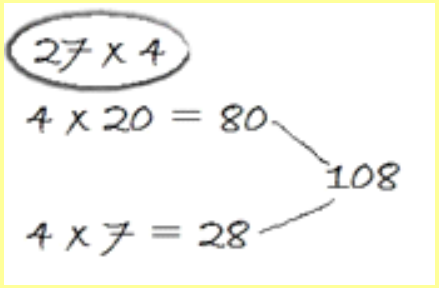
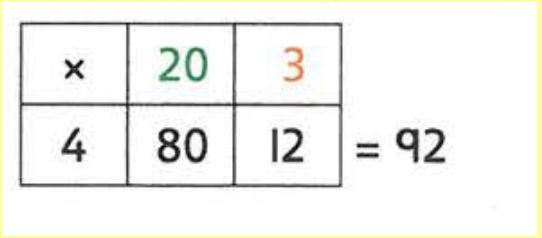
		Mental calculation	Written Calculation	Default for ALL children
	Division	• Count in 2s, 5s and 10s  • • Begin to count in 3s • Using fingers, say where a given number is in the 2s, 5s or 10s count. (E.g. 8 is the fourth number when I count in twos.) • Relate division to grouping. (E.g. how many groups 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)		• 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

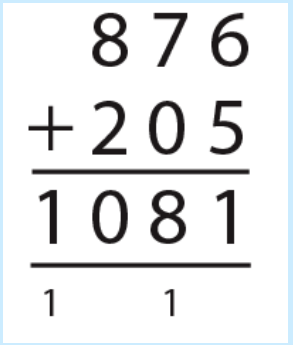
Lower Key Stage 2

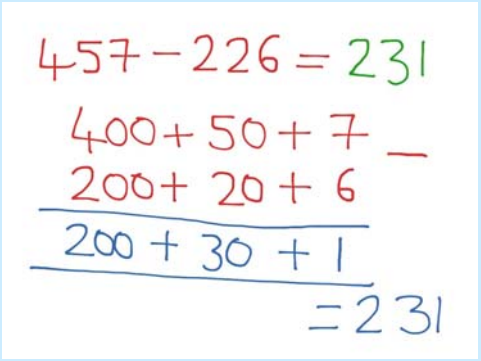
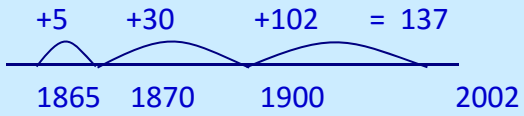
	Overview of LKS2	In the lower juniors, children build on the concrete and conceptual understandings they have gained in the Infants to develop a real mathematical understanding of the four operations, in particular developing arithmetical competence in relation to larger numbers. In addition and subtraction, 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 decimals, multiplying and dividing whole numbers by 10 and 100.

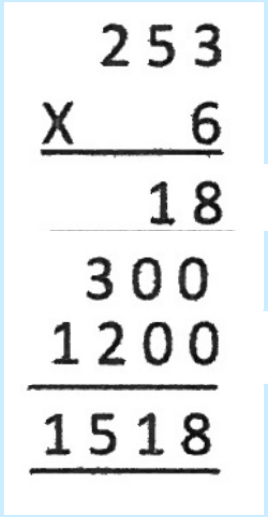
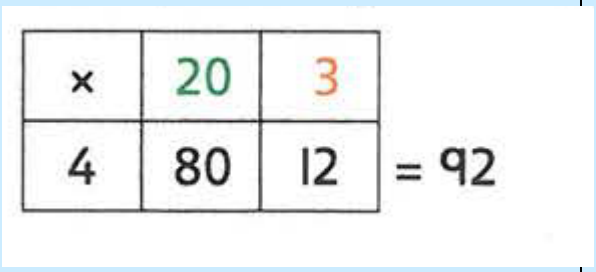
Level 3	***Addition***	Count in 100s  • Know pairs with each total to 20 • Know pairs of multiples of 10 with a total of 100 • Add any two 2-digit numbers by counting on in 10s and 1s or by using partitioning • Add multiples and near multiples of 10 and 100 • Perform place value additions without a struggle. (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) • 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  400 60 6 +300 50 8 700 110 14 • • Begin to use compact column addition to add numbers with three digits.  3 8 + 9 3 1 3 1 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

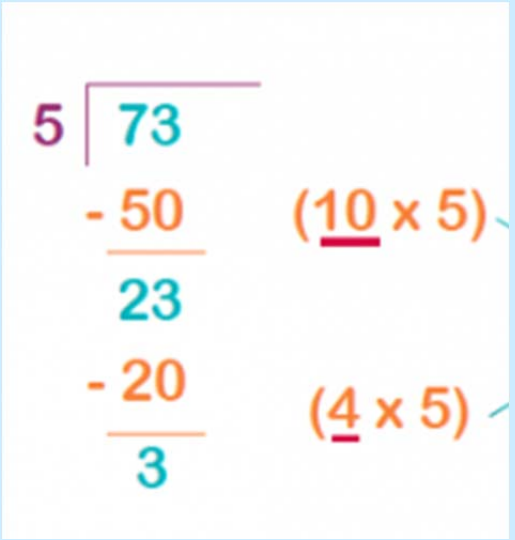
	Subtraction	• Know pairs with each total to 20 • Subtract any two 2-digit numbers • Perform place value subtractions without a struggle. (E.g. 536 – 30 = 506, etc.) • Subtract 2-digit numbers from numbers >100 by counting up. (E.g. 143 – 76 is done by starting at 76, add 4 (80) then add 20 (100) then 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 up 	• Use counting up as an informal written strategy for subtracting pairs of three-digit numbers, e.g. • 121-87 •  • Begin to subtract like fractions. (E.g. $^{7}/_{8}$ - $^{3}/_{8}$) • Use expanded column subtraction 	• 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

	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. • 	• 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
	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	• **Using tables knowledge**, perform divisions just above the 10th multiple using the written layout and knowledge of tables and understand how to give a remainder as a whole number. • 32 ÷ 6 = 5 remainder 2 • Find unit fractions of quantities and begin to find non-unit fractions of quantities • Eg ¼ of 16 is 16 ÷ 4	• 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.

Level 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  • 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

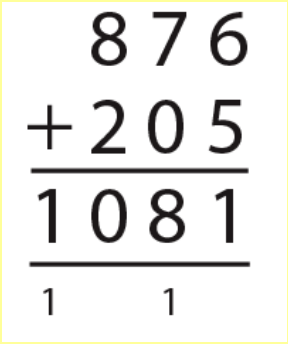
	Subtraction	• Subtract any two 2-digit numbers • Know by heart/quickly derive number bonds to 100 • Perform place value subtractions without a struggle. (E.g. 4736 – 706 = 4030, etc.) • Subtract multiples and near multiples of 10, 100 and 100 • Subtract by counting up. (E.g. 503 – 368 is done by adding: 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  • 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  • 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.

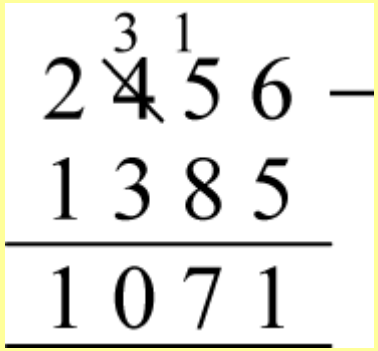
	Multiplication	• Know by heart all the multiplication facts up to 12 x 12. • Recognise factors up to 12 of two-digit numbers. • Multiply whole numbers and one-place decimals by 10, 100, 1000 • Multiply multiples of 10, 100, 1000 by single digit numbers. (E.g. 300 x 6 or 4000 x 8) • Use understanding 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.)	• Use a vertical written method to multiply a one-digit by a 3-digit number (ladder)  • Use an efficient written method to multiply a 2-digit number by a number between 10 and 20 by partitioning (grid method)  •	• 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

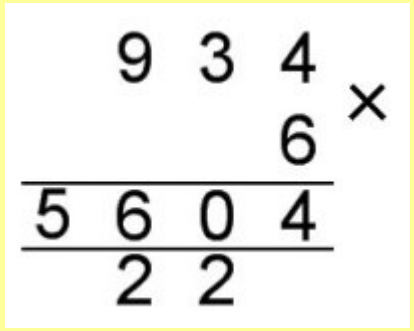
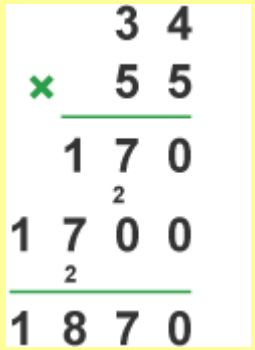
	Division	• Know by heart all the division facts up to 144 ÷ 12. • Divide whole numbers by 10, 100 to give whole number answers or answers with one decimal place • Divide multiples of 100 by 1-digit numbers using division facts. (E.g. 3200 ÷ 8 = 400) • Use place value and number facts in mental division. (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) • 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) • Skip division using a blank number line Eg: 84 ÷ 7 can be done as 1 jump of 10 (10 x- 7) 70 then 2x jumps of 7 = 14	• 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.	• 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

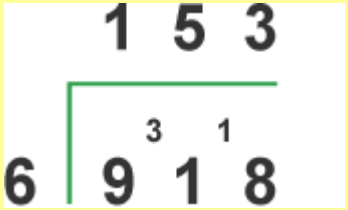
Upper Key Stage 2

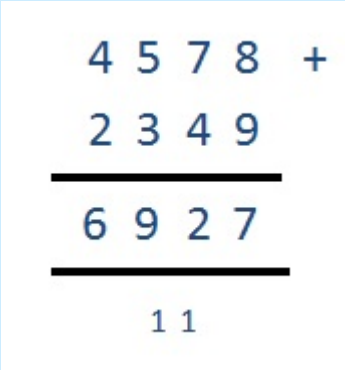
	Overview of LKS2	Children move on from dealing mainly with whole numbers to performing arithmetic operations with both decimals and fractions. They will consolidate their use of written procedures in adding and subtracting whole numbers with up to 6 digits and also decimal numbers with up to two decimal 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.

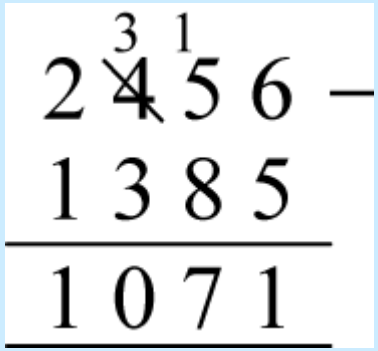
Level 5	***Addition***	• Know numbers bonds to 1 and to the next whole number • Add to the next 10 from a decimal number, *e.g. 13·6 + 6·4 = 20* • Add numbers with two significant digits only, using mental strategies. (E.g. 3.4 + 4.8 or 23,000 + 47,000) • Add one or two-digit multiples of 10, 100, 1000, 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)	• 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. • Begin to add related fractions using equivalences. (E.g. ½ + $^1/_6$ = $^3/_6$ + $^1/_6$) • <u>Choose the most efficient method in any given situation</u>	• 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

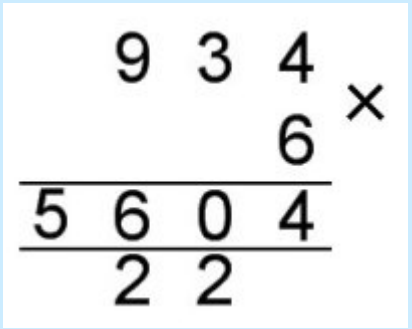
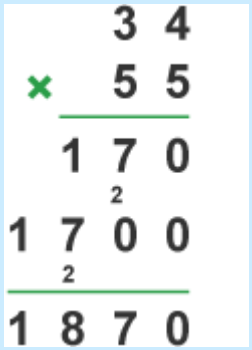
	Subtraction	• Subtract numbers with two significant digits only, using mental strategies. (E.g. 6.2 – 4.5 or 72,000 – 47,000) • Subtract one or two-digit multiples of 100, 1000, 10,000 and 100,000. (E.g. 8000 – 3000 or 600,000 – 200,000) • Subtract one or two digit near multiples of 100, 1000, 10,000 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.

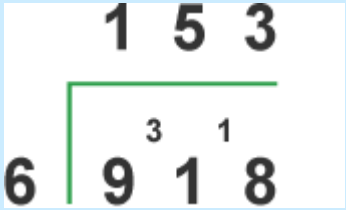
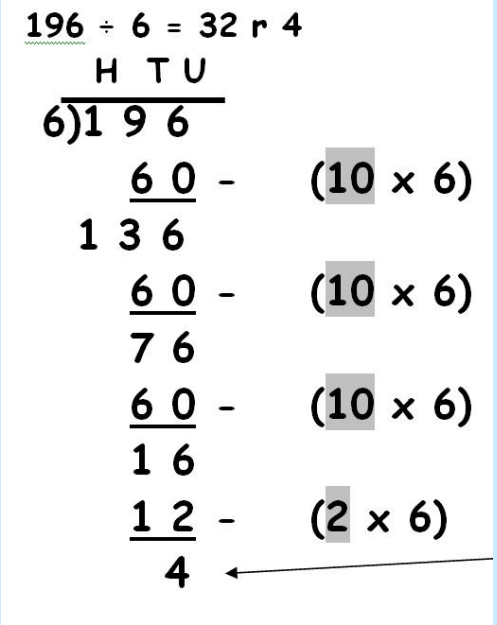
	Multiplication	• Know by heart all the multiplication facts up to 12 x 12. • Multiply whole numbers and one-and two-place decimals by 10, 100, 1000, 10,000 • Use knowledge of factors and multiples in multiplication. (E.g. 43 x 6 is double 43 x 3, and 28 x 50 is ½ of 28 x 100 = 1400) • Use knowledge of 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 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.

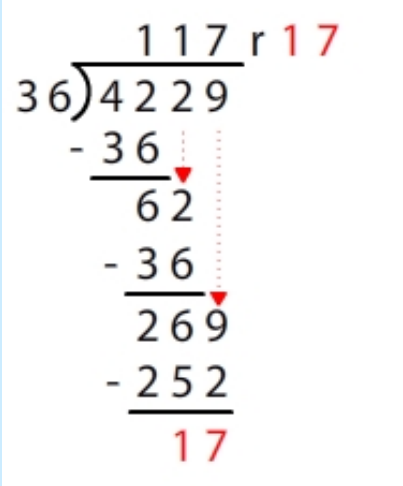
	Division	• Know by heart all the division facts up to 144 ÷ 12. • Divide whole numbers by 10, 100, 1000, 10,000 to give whole number answers or answers with 1, 2 or 3 decimal places • Use doubling and halving as mental division strategies. (E.g. 34 ÷ 5 is (34 ÷ 10) x 2) • Use knowledge of multiples and 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 division strategies • Use efficient chunking to divide numbers ≤ 1000 by 1-digit numbers. • Find unit fractions of 2 and 3-diigt numbers

Level 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.  • 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.

	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. •  • 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. • Use complementary addition for subtractions of one-place decimal numbers and amounts of money.

	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. • Multiply fractions and mixed numbers by whole numbers. • Use percentages for comparison	• 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.	• 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. Chunking 	• 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. .

			Then full long division  • 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.	