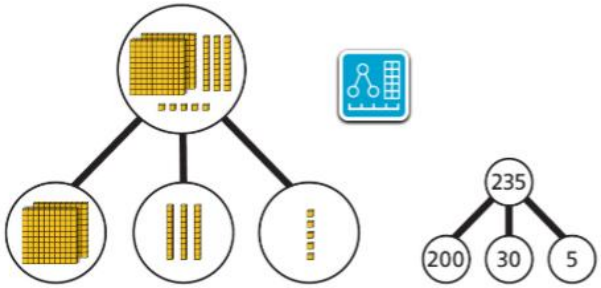
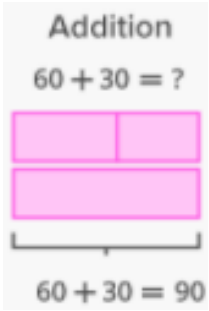
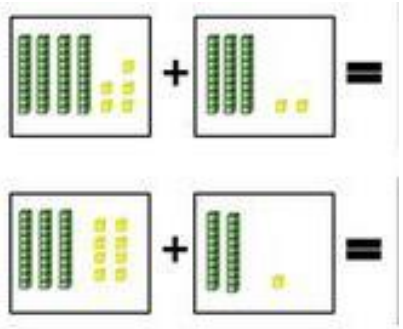
Grange Junior School Calculation Policy 2021 – Adapted for Recovery Curriculum

Multi-representation of problems using whole-part models, bar models and jottings to support calculations.







Key Question strands to use within Planning/Lessons across the school for AFL purposes
Examples of question types

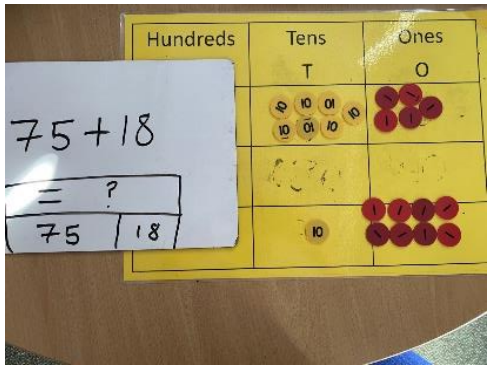
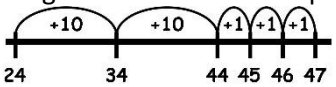
If I know… What else do I know?
What is the same? What is different? What patterns exist/ can you see?
Is that always true? Always/Sometimes/ Never

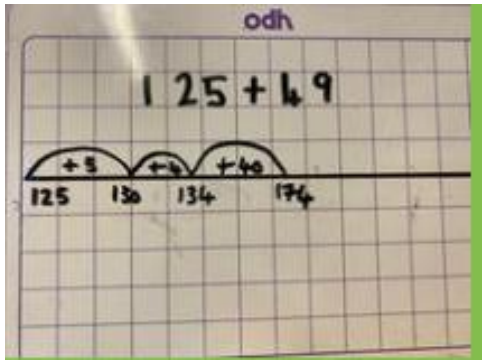
All of these…/ Some of these…/ None of these…
How many different ways? How many are possible?

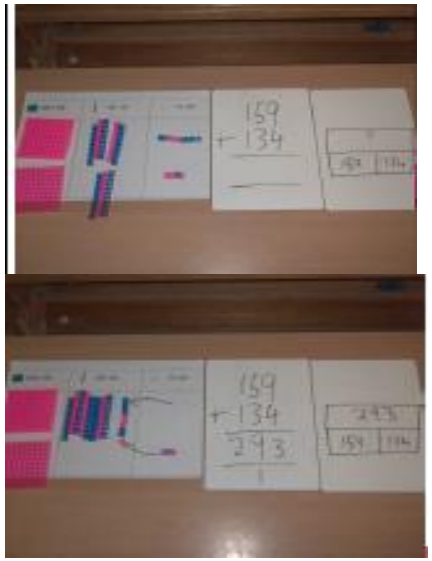
Which one is not…? Explain why …. Is incorrect?
Which set of calculations do you prefer? Why…?

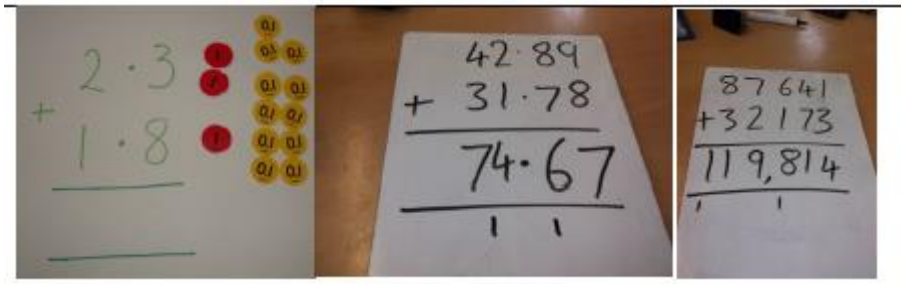
Explain what you did? How do you know? Explain your thinking…

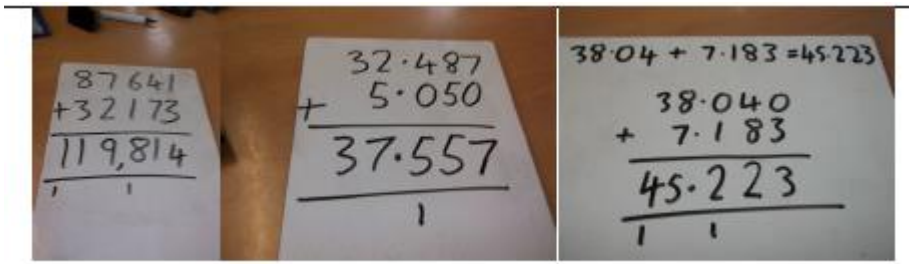
Addition

Year 3	Mental methods for year 3	Written methods	**Key facts for end of each Year group for + and -**
To be able to add numbers up to 3 digits	Can recall and use addition facts to 20 and derive and use related facts up to 100 Know pairs of multiples of 100 that total 1000 1 + 9 = 10 (Year 1) 10 + 90 = 100 (Year 2) 100 + 900 = 1000 (Year 3) Can mentally add a 2 digit number and ones Can mentally add a 2 digit number and tens Can mentally add two 2 digit numbers Can mentally add three 1 digit numbers Can mentally add a three digit number and ones Can use the compensation method to add 9 by adding 10 and taking away 1 (e.g. 34 + 9 =? 34 + 10-1) Progressing to adjusting to multiples of 10 (e.g. 38 + 68 = ? 38 + 70 – 2) Using partitioning and recombining numbers to support addition	Concrete – Use of Dienes/ counters to support addition  Using number lines to add pairs of numbers to 1000  Can add on in jumps of ten and individual jumps of 1.  Can add tens followed by ones. Use knowledge of number bonds to bridge through tens/ hundreds	**Key facts by the end of Year 3** ***Know 10 or 100 more or less than any given number*** ***To know multiples of 100 that make 1000 – Application of number bonds (e.g. – 700 + 300/ 1000- 700=300)*** ***Using Doubles, Near doubles and halving numbers up to 50*** ***Know the sequence of counting in 50's and its relationship to 5's*** ***Know the sequence of counting in 100's and its relationship to 10's*** ***Know ½ of 100=50*** ***Know ½ of 50 = 25*** • ***Know 1metre = 100cm*** • ***Know 1km =1000m*** • ***Know 1L = 1000ml*** • ***Know 1KG = 1000g*** ***Applying knowledge of halves/ quarters of numbers to measure*** *Knowing ½ 1L, 1KG, 1KM =500* *Knowing ¼ 1L, 1 KG, 1KM = 250* *Knowing ¾ 1L, 1KG, 1KM = 750*

		 Can add multiple tens across hundreds boundaries. If appropriate, Introduce children to partitioning when adding 3 digit numbers together. Children use place value understanding to add hundreds, tens and then ones using partitioning to solve 3 digit calculations. 500 + 100 = 600 60 + 90 = 150 7 + 9 = 16 600 +150 + 16 = 766 Progression measured by efficient use of the number line. Fewest steps. **E.O.Y = Children can choose most efficient method on a numberline**	

Year 4 To be able to add numbers with up to 4 digits using the formal written method of columnar addition	Mental methods for Year 4 **building on mental methods in Year 3** Can mentally add any pairs of numbers to 100 (e.g. – 67 + 33) Can draw upon knowledge of known facts to support addition (e.g. – 60+40/ 600+400/ 6000+4000) Mentally add multiples of 10/100 to numbers Can count in multiples of 1000 Can mentally find 1000 more or less than any 4 digit number Draw upon knowledge of doubles and near doubles to support addition Rounding and adjusting to the nearest 100 when working with addition calculations (e.g. 138 + 69 =? 138 + 70 -1 or 299 -48 =? 300 – 48 – 1) Using partitioning and recombining numbers to support addition where appropriate	Written Methods **Moving from number lines to formal written methods for addition.**  Progress to formal written methods ***where appropriate*** including carrying across hundreds, tens and ones boundaries when working with 3 and 4 digit numbers. Using dienes to support the understanding of carrying and exchanging. 789 + 642 becomes $\begin{array}{r} 7\ 8\ 9 \\ +\ 6\ 4\ 2 \\ \hline 1\ 4\ 3\ 1 \\ \hline 1\ 1 \end{array}$ $\begin{array}{r} 5423 \\ +\ 1967 \\ \hline 7390 \\ \hline 1\ 1 \end{array}$ Progression measured by carrying across multiple boundaries **E.O.Y = Confident with formal method**	**Key facts by the end of Year 4** ***Consolidate key facts from Year 3 on measurement conversions, halves and quarters of 100*** ***All complements of 10,000 with multiples of 1000 (e.g. 9000 and 1000/ 10,000-9000)*** ***Doubles and halves of multiples of 10 to 100 (e.g. Double 60 = 120, half 50 = 25)*** ***Use knowledge of halves/ quarters of 100 and apply to 10 and 100*** ***Can count in multiples of 25*** ***Can count in multiples of 1000*** ***Halves of any even number up to 100*** ***Recognise and write decimal equivalents to*** $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ **Add and Subtract fractions with the same denominator mentally**

Year 5	**Mental methods for Year 5**	Written methods	**Key facts by the end of Year 5**
add whole numbers with more than 4 digits, including using formal written methods (columnar addition)	Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000 Add numbers mentally with increasingly large numbers building and applying on strategies from Years 3 & 4 Using rounding and adjusting including rounding to 3dp when working with decimals. Can compensate and adjust multiples with decimals (e.g. 5.7 + 3.9 becomes 5.7. + 4.0 – 0.1)	Using counters to support addition of decimals to 2dp. Using formal written methods including carrying across hundreds, tens and ones boundaries when working with numbers up to 1,000,000.  5423 + 1967 = 7390 (1 1) 56833 + 44105	**Count forwards or backwards insteps of power of 10 for any given number up to 1,000,000** **Addition and subtraction of multiples of 10, 100 and 1000** **Doubles and halves of multiples of 10 to 100 (e.g. Double 60 = 120, half 50 = 25)** **Halves of any number up to 100 (e.g. half of 44=22, half of 51=25.5)** **Squares of all number up to 12** **Multiplying and dividing any number by 10 and 100** **Quadruples (X4) of all numbers up to 10 (e.g. 6 x 4 = 24)**

Year 6 see appendix 1 Maths National Curriculum	**Mental methods for Year 6** **Pupils now apply all mental strategies taught for addition with increasingly large numbers, including decimals.** **Use estimations to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy** **Pupils round answers to a specified degree of accuracy**	Use of formal addition methods to solve increasingly large, complex calculations. 	**Key facts by the end of Year 6** **Ensuring Key facts from Years 3,4 and 5 are sufficient to support SATS preparation** conversion of units of measure, using decimal notation up to three decimal places where appropriate Convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places. convert between miles and kilometres

Subtraction

Year 3

To be able to Subtract numbers with up to 3 digits

Mental methods for year 3

Can recall and use subtraction facts to 20 and derive and use related facts up to 100

10 – 8 = 2

100 – 80 = 120

Apply this beyond 100

200 -80- 120

Can mentally subtract a 2 digit number and ones

Can mentally subtract a 2 digit number and tens

Can mentally subtract two 2 digit numbers

Can mentally subtract a three digit number and ones, tens and hundreds.

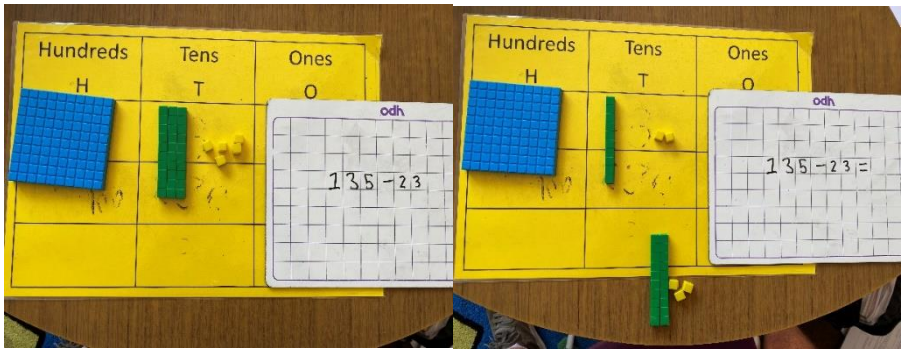
Can use the compensation method to subtract 10 and adding 1 (e.g. 34 - 9 =? 34 – 10+1)

Progressing to adjusting to multiples of 10 (e.g. 68 - 38 = ? 70 - 38 + 2)

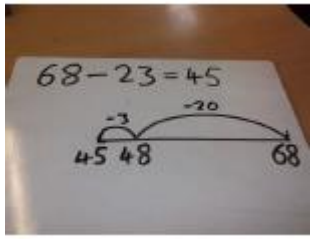
Using partitioning and recombining numbers to support addition

Written methods

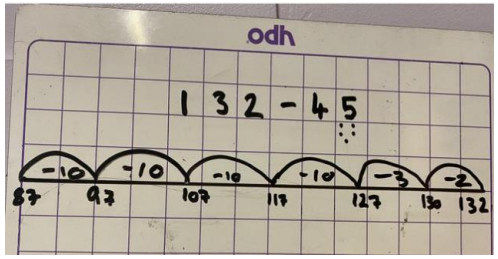
Concrete – Use of Dienes/ counters to support subtraction



Using number lines to subtract pairs of numbers under 100 initially and **where appropriate.**

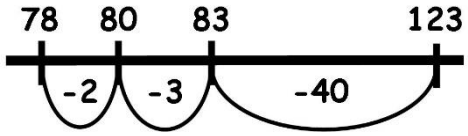
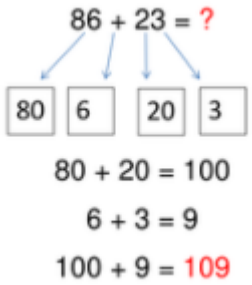
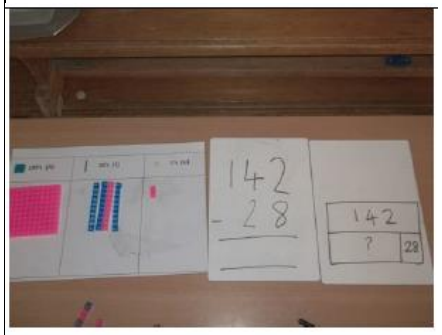
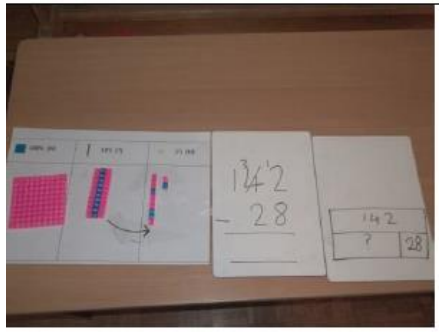


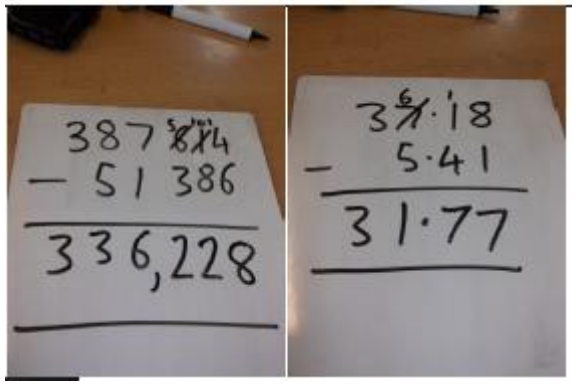
Can subtract by partitioning tens and ones and subtracting tens first followed by the ones or vice versa .

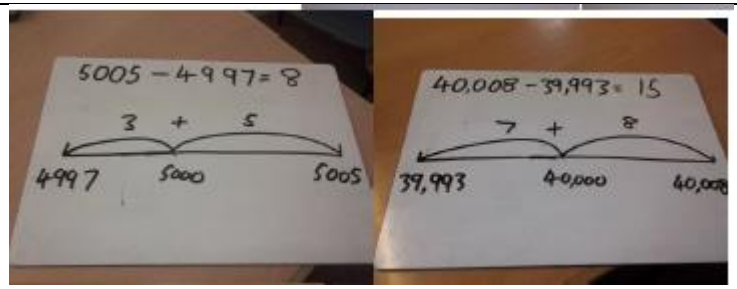
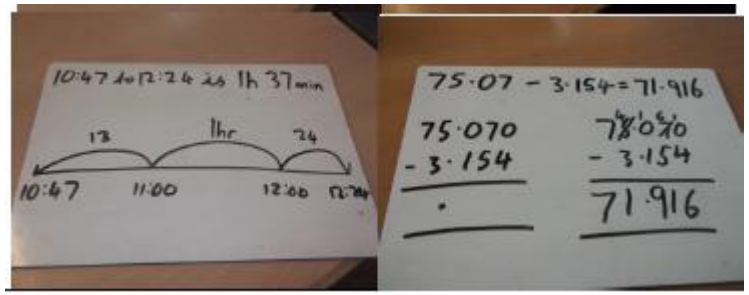


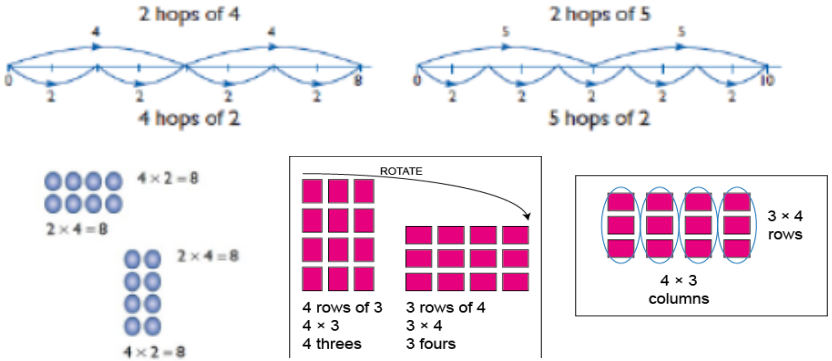
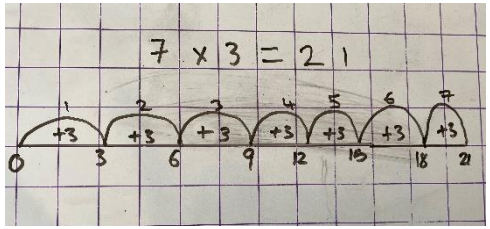
Progressing onto subtracting 3 digit and a 1 or 2-digit number.

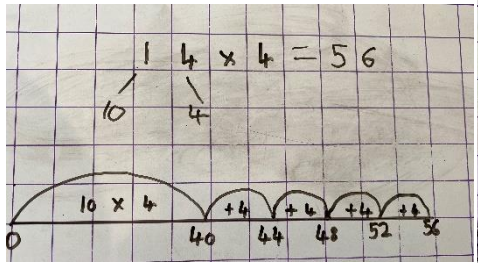
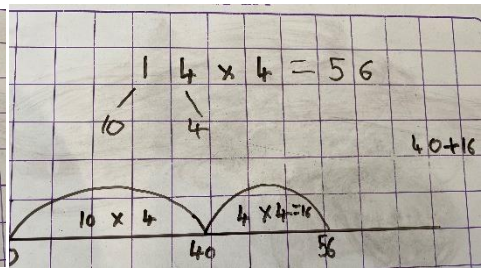
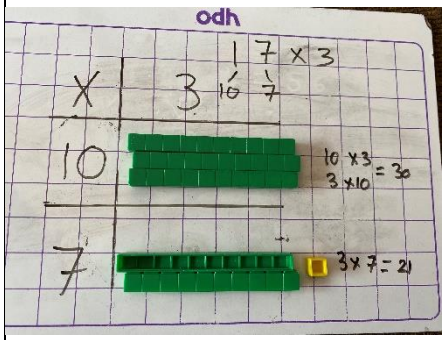
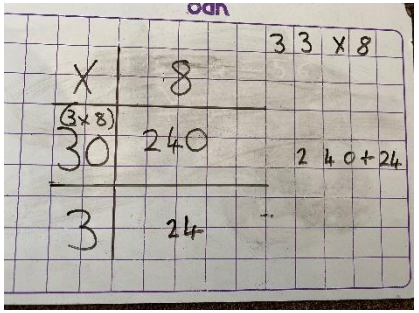
Can subtract by bridging back through a place value boundary (tens/hundreds) and subtracting remaining ones before tens.

		 Progression to larger chunked jumps of multiples of ten/ hundreds to support efficient calculations.  If appropriate, introduce children to partitioning as an efficient method for subtraction calculations. Numbers not crossing place value boundaries. Progression measured by efficient use of the number line. Fewest steps. **E.O.Y = Children can choose most efficient method on a numberline**
Year 4 Subtract numbers with up to 4 digits using columnar subtraction where appropriate	**Mental methods for Year 4 building on mental methods in Year 3** Can mentally subtract pairs of numbers below 100 (e.g. 67 - 33) Can draw upon knowledge of known facts to support subtraction (e.g. – 100+60/ 1000- 600/ 10,000 - 6000) Mentally subtract multiples of 10/100 from any 4 digit number Rounding and adjusting to the nearest 100 when working with subtraction calculations	Written methods Continuing to use concrete resources to support – Introduce children to formal column subtraction progressing to exchanging from tens back to ones.   Progression to using formal written columnar subtraction set out with 3 digit and onto 4 digit. Progression seen through exchanging across place value boundaries.

	(e.g. 138 - 69 =? 138 - 70 +1 or 299 -48 =? 300 – 48 +1) Using partitioning and recombining numbers to support subtraction where appropriate	7 13 1 8 4 5 - 5 6 9 2 7 6 3 12 1 4 3 2 8 - 1 4 3 6 8 9 2
Year 5 Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)	**Mental methods for Year 5** Subtract numbers mentally with increasingly large numbers building and applying on strategies from Years 3 & 4 Using rounding and adjusting including rounding to 3dp when working with decimals. Can compensate and adjust multiples with decimals (e.g. 5.7 - 3.9 becomes 5.7. - 4.0 + 0.1)	Written methods Using counters to support subtraction of decimals to 2dp. Using formal written methods including carrying across hundreds, tens and ones boundaries when working with numbers up to 1,000,000.  8 12 11 1 9 3 2 1 • 9 7 - 4 5 7 8 • 5 3 4 7 4 3 • 4 4 Use of increasingly efficient methods for solving larger subtraction calculations with counting on where appropriate.

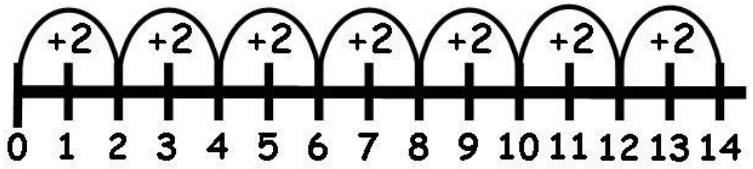
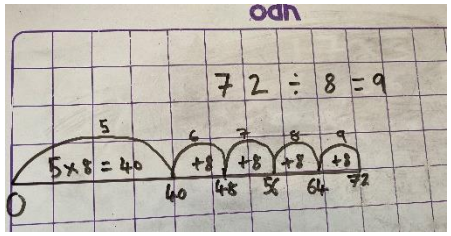
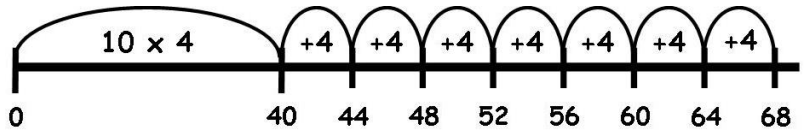
		
Year 6 see appendix 1 Maths National Curriculum	**Mental methods for Year 6** **Pupils now apply all mental strategies taught for subtraction with increasingly large numbers, including decimals.** **Use estimations to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy** **Pupils round answers to a specified degree of accuracy**	Use of formal subtraction methods to solve increasingly large, complex calculations with the most efficient strategy including counting on where appropriate. T Th Th H T O 7 $^{4}\cancel{5}$, $^{1}5$ $^{2}\cancel{3}$ $^{1}2$ - 2 2, 6 2 3 5 2, 9 0 9 $^{0}\cancel{1}$ $^{1}1$ 7 6 5 • $^{8}\cancel{9}$ $^{11}\cancel{2}$ $^{1}1$ - 1 0 9 4 2 • 8 7 6 0 0 8 2 3 • 0 4 5 

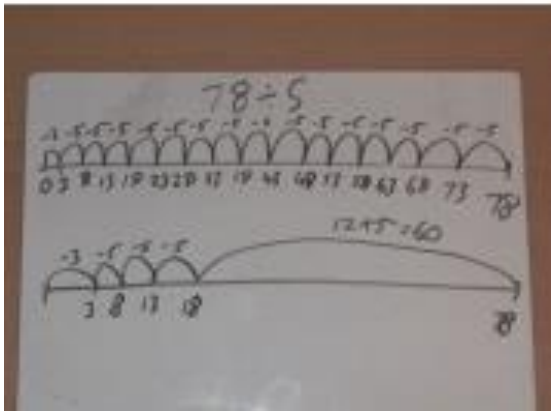
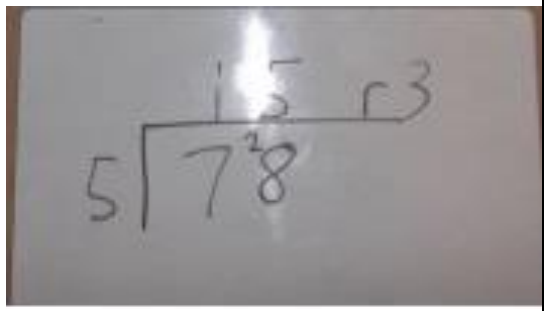
Statements taken from the NC	Multiplication	
Year 3 write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	**Mental methods for year 3 Multiplication** Children are fluent with the recall of 2x, 10x and 5x table and related division facts from KS1 Year 3 children recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables Children understand the power of multiplying any number by 10 (10 x bigger) and can apply this. Children see the commutative link and associativity with calculations and use this to work out mentally some 2-digit x 1 digit numbers (e.g. 3 x 3 = 9 so 30 x 3 =90 and 4 x 5 = 20 so 50 x 4 = 200)	**Written methods for Year 3** **Use of number lines and arrays to investigate commutativity of multiplication**   Use of number lines to solve 1 digit x 1 digit on a number line Progressing onto more efficient strategies on number line using chunked jumps

		  **Progression measured by number of jumps to reach answer.**   X | 7 30 | 210 4 | 28 =238 **When secure with number line strategy and fluency of facts is at a good level, introduce Grid method.**
Year 4 Multiply two-digit and three-digit numbers by a one-digit number using formal written layout	**Mental methods for year 4 Multiplication** Build on fluency of 2,3,4,5, 8 and 10 x table fluency from Year 3 **daily** Children understand the power of multiplying any number by 10 and 100 (10 x/ 100x bigger) and can apply this.	Written Methods for Year 4 Continue with grid method into fluency level is sufficient for formal short multiplication. Multiplying 2 digit by 1 digit progressing onto 3 digit x 1 digit involving numbers in the 1-12x table.

	Use known **factor pairs and commutativity** to support efficient recall and mental calculations **Children to recall all 12x table facts for Year 4 Times table Check in summer term**	 24 × 6 becomes 2 4 × 6 1 4 4 2 Answer: 144 342 × 7 becomes 3 4 2 × 7 2 3 9 4 2 1 Answer: 2394
Year 5 Multiply numbers up to 4 digits by a one or two digit number using a formal written method including long multiplication for two-digit numbers	**Mental methods for Year 5 Multiplication** **Mentally use place value understanding to scale up or down by a factor of 10 to enable to accurately multiply by 10, 100 and 1000.** identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers **Mentally** multiply whole numbers and those involving decimals by 10, 100 and 1000 **Recall all square numbers up to 12** **Recall prime numbers up to 19** *Be able to recognise if a number is prime up to 100*	Written Methods for Year 5 Build on formal written methods from Year 4 extending to 4 digit x 1 or 2 digit numbers. Progression onto long multiplication method for two-digit numbers.  124 × 26 becomes 1 2 1 2 4 × 2 6 7 4 4 2 4 8 0 3 2 2 4 1 1 Answer: 3224 165 X 32 1 1 330 1 1 4950 5280 1 **Multiply proper fractions and mixed numbers by whole numbers supported by materials and diagrams – Use appropriate strategy based on class assessment**

	Be able to recognise and use square numbers and cube numbers	
Year 6 Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal method of long multiplication	**Mental methods for Year 6** **Multiplication** **Multiply simple pairs of proper fractions writing the answer in its simplest form (e.g. 1/4 X 1/2 = 1/8)** **Multiply numbers by 10, 100 and 1000 giving answers up to 3 decimals places** **Draw upon understanding of equivalence to recall between simple fractions, decimals and percentages.**	Written Methods for Year 6 Progression onto long multiplication for increasingly challenging calculations 124 x 26 becomes 1 2 4 x 2 6 7 4 4 2 4 8 0 3 2 2 4 1 1 Answer: 3224  973 X 86·2 1 1 194·6 4 1 1 5838 5 2 77840 83872·6 1 1 1 1 2.43 x 7 = 17.01 3 2 2.4 x 5 = 12.0 2 Use of short multiplication to multiply decimals by a whole number

Statements taken from the NC	Division	
Year 3 write and calculate mathematical statements for multiplication and **division** using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	**Mental methods for year 3 Multiplication & Division** Children are fluent with the recall of 2x, 10x and 5x table and related **division facts** from KS1 Year 3 children recall and use multiplication and **division facts** for the 3, 4 and 8 multiplication tables Children understand the power of multiplying any number by 10 (10 x bigger) and **dividing by 10** (10x smaller). Children see the commutative link and associativity with calculations and use this to work out mentally some 2-digit x 1 digit numbers (e.g. 3 x 3 = 9 so 30 x 3 =90/9÷3 =3 90 ÷3 = 30 and 4 x 5 = 20 so 50 x 4 = 200/ 20 ÷ 4 = 5 200 ÷ 4 = 50)	**Written methods for Year 3** **Use of arrays to investigate commutativity of multiplication and division – finding related facts** **Progression onto using number line to count in divisor starting from 0.**  **Progression measured by efficient number of jumps. Children encouraged to use known facts to support reaching answer more efficiently**  **Progression to 2 digit** ÷ 1 digit using chunking on a number line. Partitioned jumps to support reaching an answer efficiently.  **Progression measured by number of jumps to reach answer.**

Year 4 write and calculate mathematical statements for division using the multiplication tables that they know including using mental strategies and progressing to formal written methods	**Mental methods for year 4 Multiplication** Build on fluency of 2,3,4,5, 8 and 10 x table fluency and **related division facts** from Year 3 **daily** Children understand the power of multiplying any number by 10 and 100 (10 x/ 100x bigger) and **dividing any number by 10 and 100 (10x/100x smaller)** Use known **factor pairs and commutativity** to support efficient recall and mental calculations for multiplication and **division calculations** **Fluent** with multiplication and **division facts up to 12 x 12**	Written Methods for Year 4 Progression from number lines to short division. Progression onto working with remainders $7\overline{)98}$ = 14  

Year 5

Divide numbers up to 4 digits by a one digit number using a formal written method of short division and interpret remainders appropriately for the context

Mental methods for Year 5 Multiplication

Mentally use place value understanding to scale up or down by a factor of 10 to enable to accurately multiply and divide by 10, 100 and 1000.

Mentally multiply and **divide** whole numbers and those involving decimals by 10, 100 and 1000

Pupils can use known facts and mental strategies to work out percentages such as 1%, 10%, 25% of an amount.
(e.g. 20% of 3000 = 600 10% = 300 = 10% x 2 or 51% of 900 = 459 50% = ½ = 450. 1% = 900 ÷100 = 9)

Know percentage equivalents of 1/2 , 1/4 ,2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25

Written Methods for Year 5

Use of short multiplication to solve up to 4 digit calculations.

98 ÷ 7 becomes

$$7\overline{)98} = 14$$

Answer: 14

432 ÷ 5 becomes

$$5\overline{)432} = 86 \text{ r } 2$$

Answer: 86 remainder 2

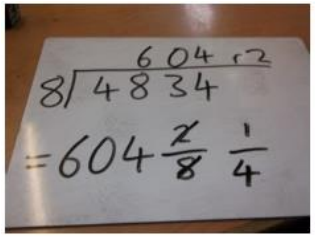
Progression onto using long division for large numbers and decimals. Children to be encouraged to write known facts to support efficiency in long division.

432 ÷ 15 becomes

		2	8	
1	5	4	3	2
		3	0	0	15×20
		1	3	2	
		1	2	0	15×8
			1	2	

$\frac{12}{15} = \frac{4}{5}$

Answer: $28\frac{4}{5}$



$$72\overline{)983}$$

$-\ 720$ (10 × 72)

263

$-\ 216$ (3 × 72)

47

10 × 72 = 720
5 × 72 = 360
2 × 72 = 144
1 × 72 = 72

Year 6	**Mental methods for Year 6 Division**	Written Methods for Year 6
Divide numbers up to 4 digits by a two-digit whole number using the formal written method of division, and interpret remainders, as a whole number remainders, fractions, or by rounding, as appropriate for the context Divide numbers up to 4 digits by a two-digit whole number using the formal written method of division, and interpret remainders appropriately for the context Use written division methods	Divide proper fractions by whole numbers (e.g. 1/3 ÷2 = 1/6) Multiply and **divide numbers** by 10, 100 and 1000 giving answers up to 3 decimals places	Use of Long division to divide large numbers by two-digit numbers, even when there is a remainder. 63 ⟌ 6955 - 6300 (100 × 63) 655 - 630 (10 × 63) 25 =110 r25 10 x 63 = 630 5 x 63 = 315 2 x 63 = 126 1 x 63 = 63 9 ⟌ 4.05 = 0.45 **Long division** 432 ÷ 15 becomes 1 5 ⟌ 4 3 2 — 2 8 r 12 3 0 0 1 3 2 1 2 0 1 2 Answer: 28 remainder 12 432 ÷ 15 becomes 1 5 ⟌ 4 3 2 — 2 8 3 0 0 (15×20) 1 3 2 1 2 0 (15×8) 1 2 $\frac{12}{15} = \frac{4}{5}$ Answer: $28\frac{4}{5}$ 432 ÷ 15 becomes 1 5 ⟌ 4 3 2.0 — 2 8.8 3 0 1 3 2 1 2 0 1 2 0 0 Answer: 28·8

in cases where the answer has up to two decimal places		