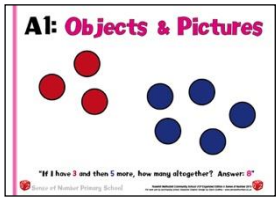
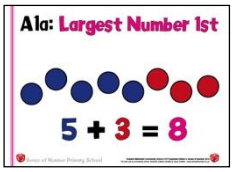
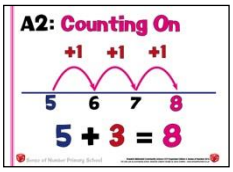
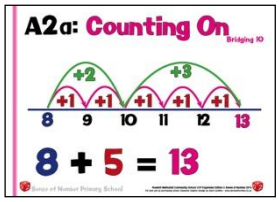
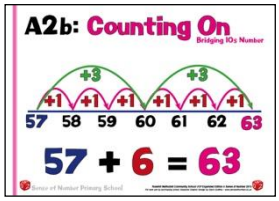
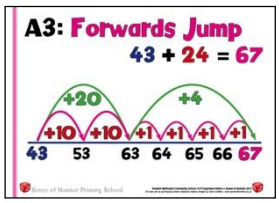
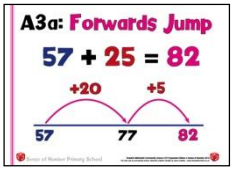
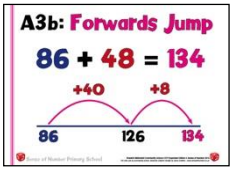
St Barnabas CE Primary School

Written Calculation Policy

A visual guide to how methods of calculation are taught in our school.

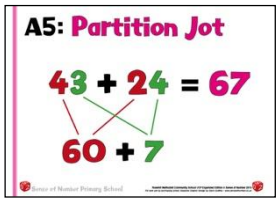
Written Addition Methods

Foundation Stage and Stage 1	Initially, children need to represent addition using a range of different resources, and understand that a total can be found by counting out the first number, counting out the second number then counting how many there are altogether. **3 + 5 = 8** 
	This will quickly develop into placing the largest number first, either as a pictorial / visual method or by using a number line. **5 + 3 = 8**   5 (held in head) then count on 3 ("5 … 6, 7, **8**")
Stage 1/2	Steps in addition can be recorded on a number line. The steps often bridge through 10. **8 + 5 = 13**  8 (held in head) then count on 5 ("8 … 9, 10, 11, 12, **13**")
	The next step is to bridge through a multiple of 10.  57 (held in head) then count on 6 ("57 … 58,59,60,61,62,63")
	
	Develop to crossing the 10s, then the 100s boundary **57 + 25 = 82** **86 + 48 = 134**  

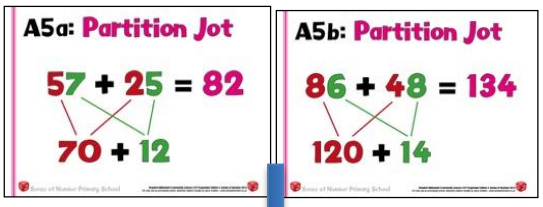
Partition Jot

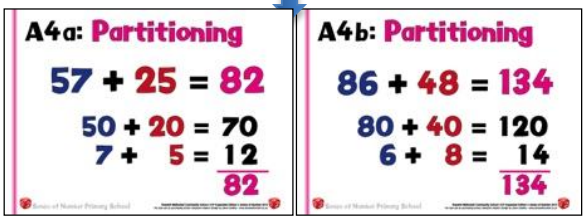
Stage 2/3

As soon as possible, refine this method to a much quicker and clearer '**Partition Jot'** approach

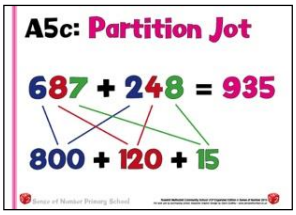


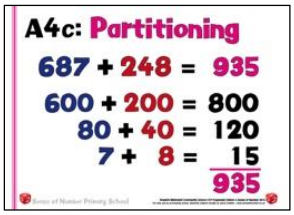
As before, develop these methods, especially Partition Jot, towards crossing the 10s and then 100s.





Stage 3/4

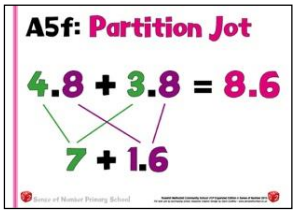


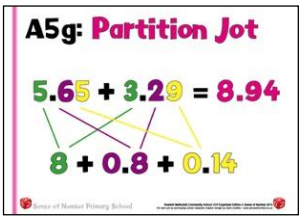


Use this method to partition money.

Stage 5/6

Partition jot is also extremely effective as a quicker alternative to column addition for decimals.





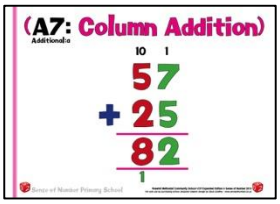
Addition Column Method

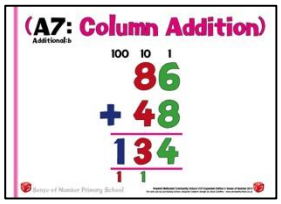
Stage 3/4

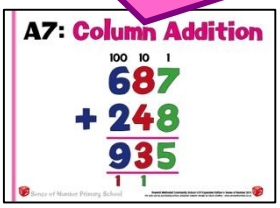
'Carry' ones then ones and tens

Use the words 'carry ten' and 'carry hundred', not 'carry one'

Record carry digits below the line.

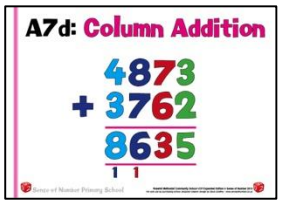






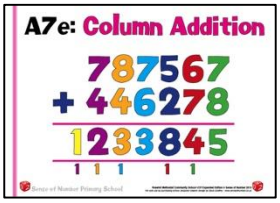
Stage 4

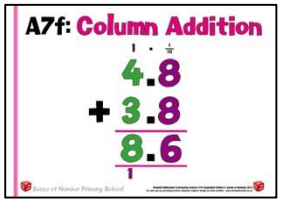
Once confident, use with 4 digit numbers **(Year 4).**

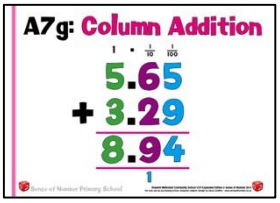


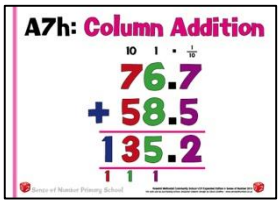
Stage 5/6

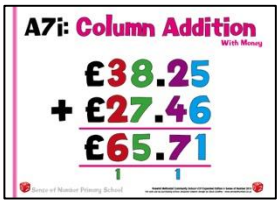
Extend to 5/6 digit calculations then decimal calculations **(Year 5)**



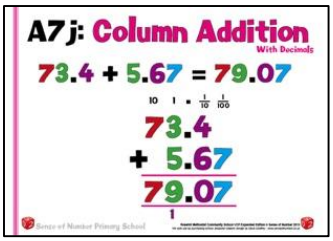


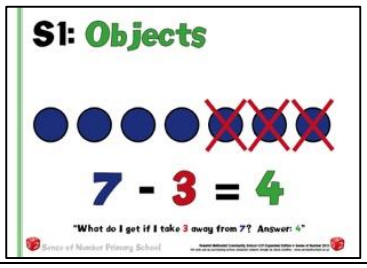
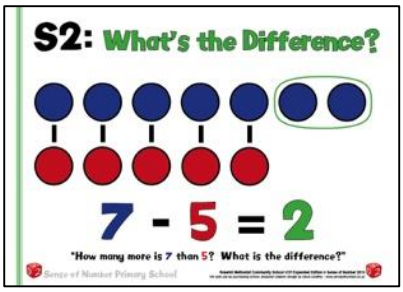




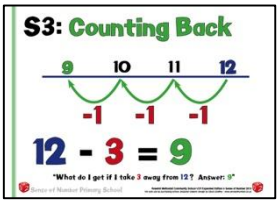
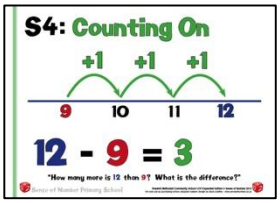
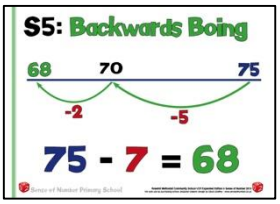
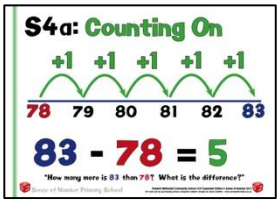
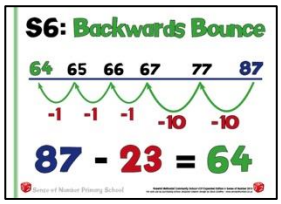
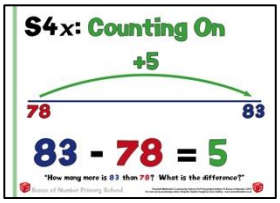
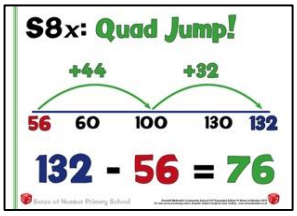
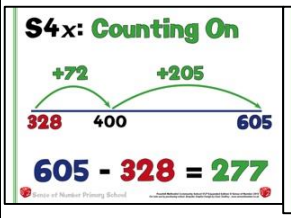
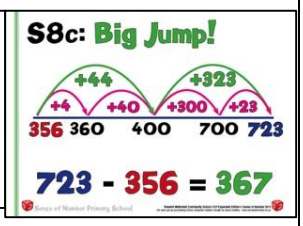


The key skill in upper Key Stage 2 that needs to be developed is the laying out of the column method for calculations with decimals in different places.



	Subtraction
Foundation Stage/ Stage 1	Early subtraction in EYFS will primarily be concerned with '***taking away***', and will be modelled using a wide range of models and resources.
	
	This will continue in Year 1, using resources and images (including the desktop number track / line) to practise taking away practically, and then counting back on demarcated number lines.
	In Year 1, it is also vital that children understand the concept of subtraction as ***'finding a difference'*** and realise that **<u>any</u>** subtraction can be answered in 2 different ways, either by counting up or counting back. **Again, this needs to be modelled and consolidated regularly using a wide range of resources, especially multilink towers, counters and Numicon.** 

Using the empty number line

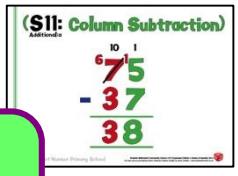
	Subtraction by counting back (or taking away)	Subtraction by counting up (or complementary addition)
	The empty number line helps to record or explain the steps in mental subtraction. It is an ideal model for **counting back** and **bridging ten**, as the steps can be shown clearly. It can also show **counting up** from the smaller to the larger number to **find the difference.**	
Stage 1	The steps often bridge through a multiple of 10. **12 – 3 = 9** 	Small differences can be found by counting up **12 – 9 = 3** 
Stage 2/3	This is developed into crossing any multiple of 10 boundary. **75 – 7 = 68** 	For 2 (or 3) digit numbers close together, count up **83 – 78 = 5** First, count in ones 
	For 2 digit numbers, count back in 10s and 1s **87 – 23 = 64** 	Then, use number facts to count in a single jump 
Stage 3/4		 The number line method is equally as effective when crossing the hundreds boundary, either by the triple / quad jump strategy or by counting in tens then ones.  

Standard Column Method

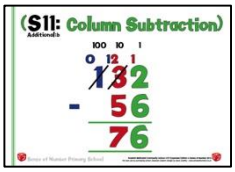
Mainly Stage 4 +

As with expanded method, and using practical resources such as place value counters to support the teaching, children in Years 3 or 4 will quickly move from decomposition via 2-digit number ‘starter’ examples to 2 / 3 digit and then 3 digit columns.

75 – 37

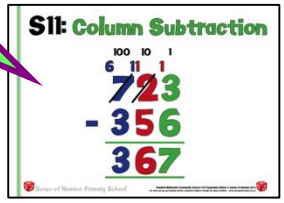


132 – 56



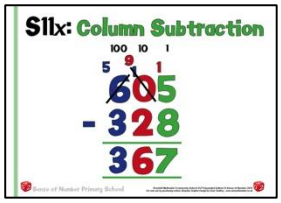
Continue to refer to digits by their actual value, not their digit value, when explaining a calculation. E.g. One hundred and twenty subtract fifty.

723 – 356



Again, use examples containing zeros.

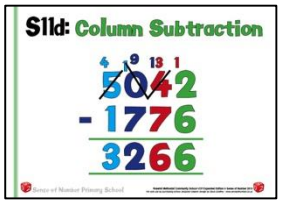
605 – 328



Stage 4

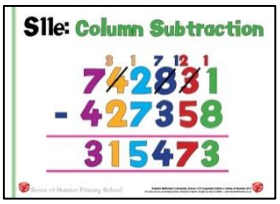
From late Y4 onwards, move onto examples using 4 digit (or larger) numbers and then onto decimal calculations.

5042 – 1776

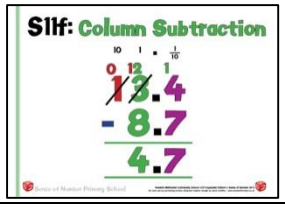


Year 5/6

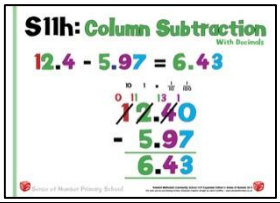
In Years 5 & 6 apply to any ‘big number’ examples and then on to decimals.



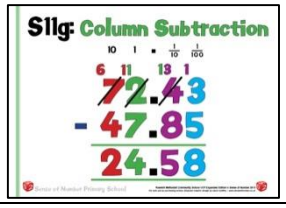
13.4 – 8.7



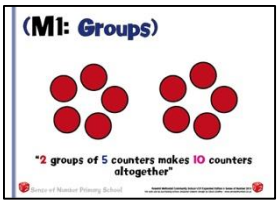
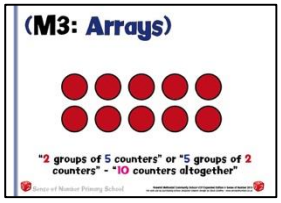
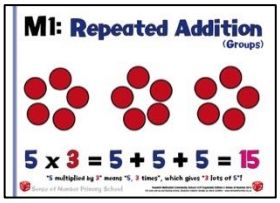
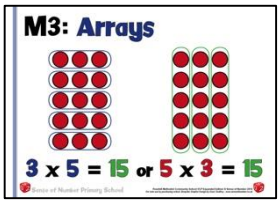
12.4 – 5.97

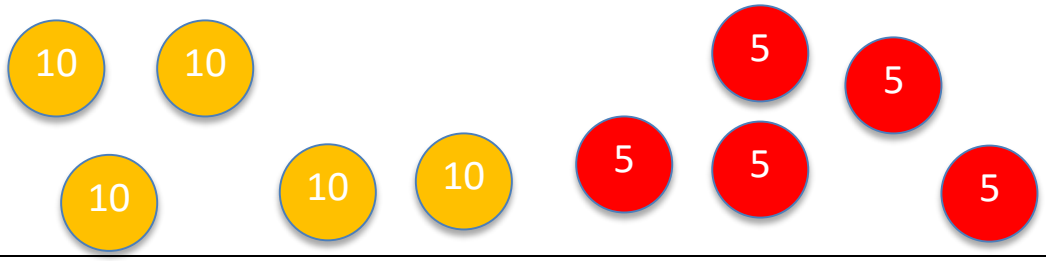
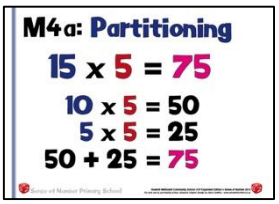


72.43 – 47.85

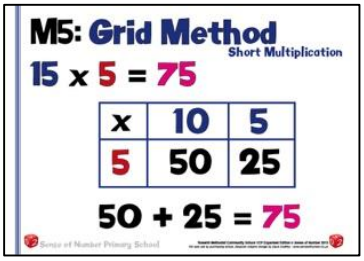
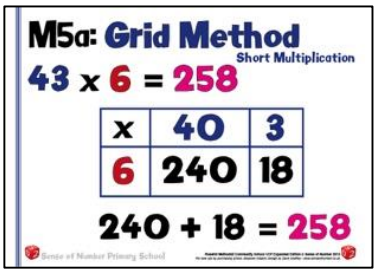
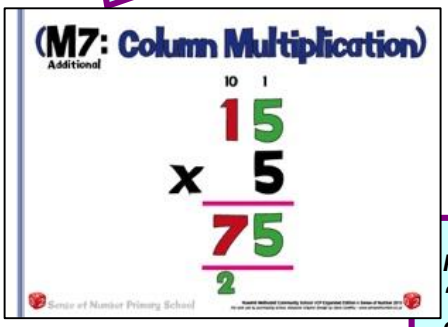
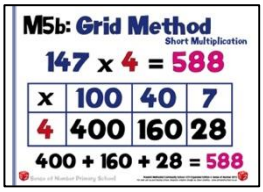
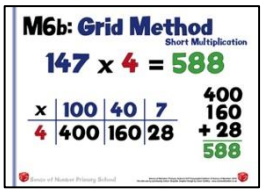
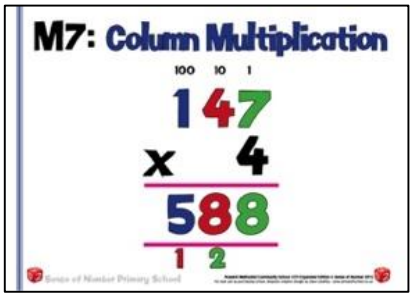
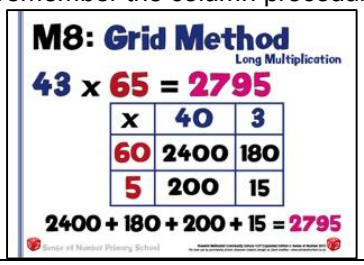
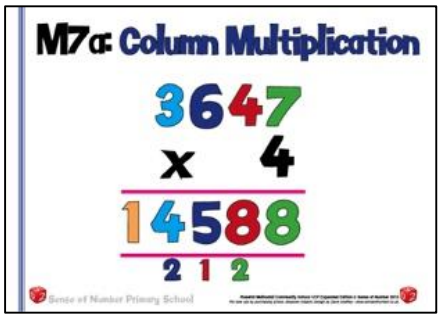


Written Multiplication Methods

Foundation Stage	In Early Years, children are introduced to grouping, and are given regular opportunities to put objects into groups of 2, 3, 4, 5 and 10. They also stand in different sized groups, and use the term 'pairs' to represent groups of 2. Using resources such as Base 10 apparatus, Numicon, multi-link or an abacus, children visualise counting in ones, twos, fives and tens, saying the multiples as they count the pieces. E.g. Saying '10, 20, 30' or 'Ten, 2 tens, 3 tens' whilst counting Base 10 pieces
Stage 1	Begin by introducing the concept of multiplication as repeated addition. Children will make and draw objects in groups (again using resources such as Numicon, counters and multi-link), giving the product by counting up in 2s, 5s, 10s and beyond, and writing the multiplication statement.  Extend into making multiplication statements for 3s and 4s, using resources (especially real life equipment such as cups, cakes, sweets etc.) **Make sure from the start that all children say the multiplication fact the correct way round, using the word 'multiply' more often than the word 'times'.** For the example above, there are 5 counters in 2 groups, showing **5 multiplied by 2 (5x2),** **not** 2 times 5. It is the **'5'** which is being scaled up / made bigger / **multiplied**. **'5 multiplied by 2' shows '2 groups of 5' or 'Two fives'**
	Develop the use of the array to show linked facts (commutativity). Emphasise that all multiplications can be worked out either way. (2 x 5 = 5 x 2 = 10) 
Stage 2	Build on children's understanding that multiplication is repeated addition, using arrays and number lines to support the thinking. Explore arrays in real life.  Start to emphasise commutativity, e.g. that 5 x 3 = 3 x 5
Continue to emphasise multiplication the correct way round. ***E.g. 5 x 3 = 5 + 5 + 5*** ***5 multiplied by 3 = 15***	 

Stage 3	Extend the above methods to include the 3, 4, 6 and 8 times tables. Continue to model calculations, where appropriate, with resources such as Numicon, Place Value Counters, counting quickly in different steps and placing / moving the resource. Extend the use of resources to 2 digit x 1 digit calculations so that children can visualise what the calculation looks like. 15 x 5 can be visualized as 10 x 5 and 5 x 5 
	Then begin to partition using **jottings.** 

Written Methods - Short Multiplication

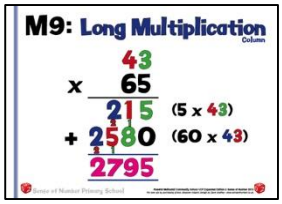
	Grid Multiplication	Column multiplication
Stage 3	It is recommended that the grid method is used as the main method within Year 3. It clearly maintains place value, and helps children to visualise and understand the calculation better.  	***When setting out calculations vertically, begin with the ones first (as with addition and subtraction).***
Stage 4	Continue to use both grid and column methods in Year 4 for more difficult 2 digit x 1 digit calculations, extending the use of the grid method into mental partitioning for those children who can use the method this way.  	 ***Place the 'carry' digit below the line***
	For 3 digit x 1 digit calcualtions, both grid and standard methods are efficient. Continue to use the grid method to aid place value and mental arithmetic.   	
Stage 5	The grid method may continue to be the main method used by children who find it difficult to remember the column procedure, or children who need the visual link to place value.  	

Long Multiplication (TU x TU)

Column multiplication

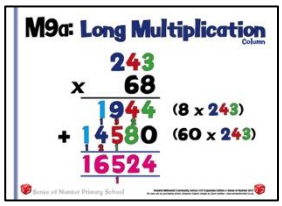
Stage 5

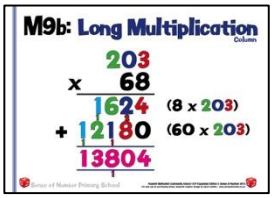
Children should only use the 'standard' column method of long multiplication if they can regularly get the correct answer using this method.



Stage 6

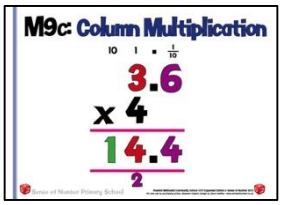
Most children, at this point, should be encouraged to choose the standard method. For 3 digit x 2 digit calculations it is especially efficient, and less prone to errors when mastered. **Although they may find the grid method easier to apply, it is much slower / less efficient.**

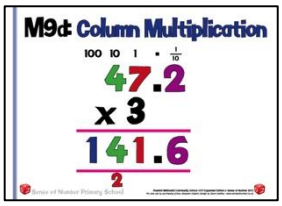


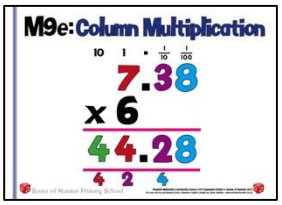


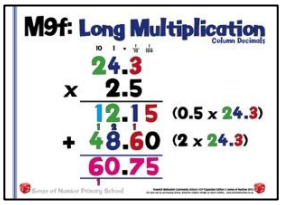
Stage 6

Extend the use of standard method into the use of decimals.

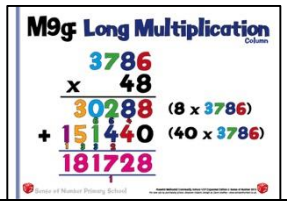


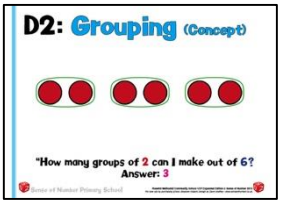
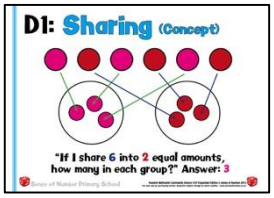
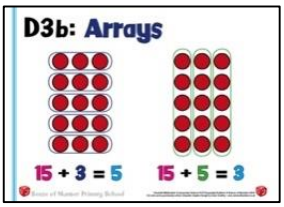
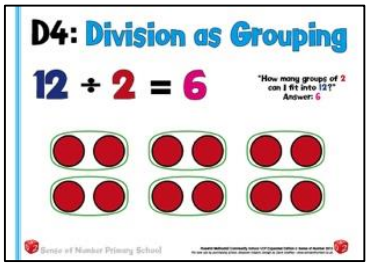
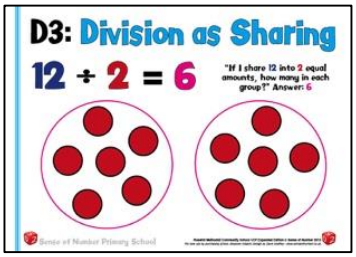




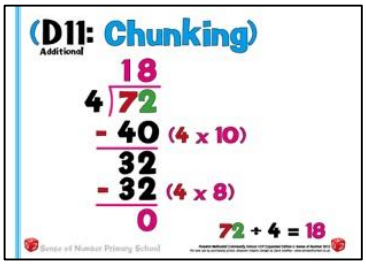
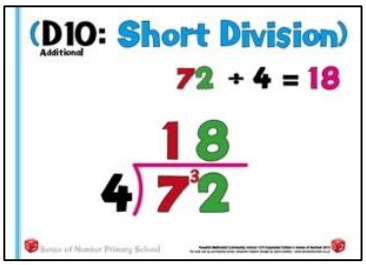
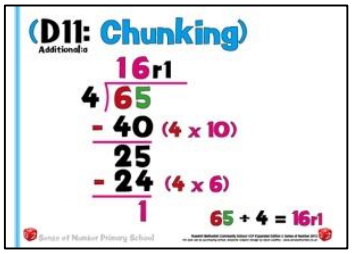
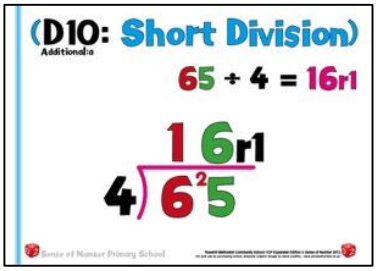
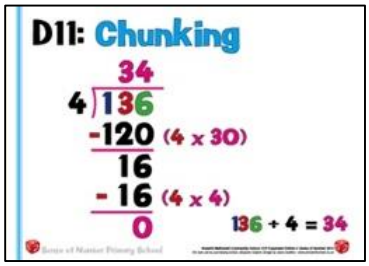
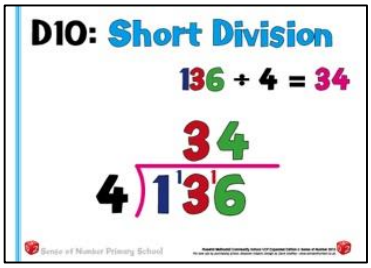
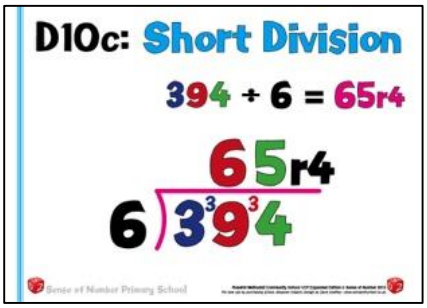
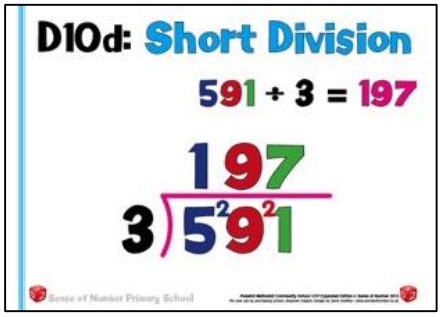


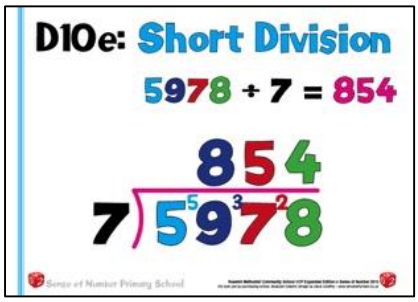
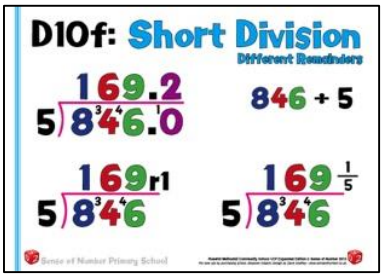
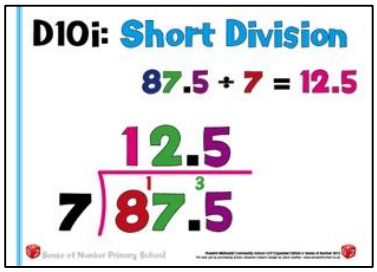
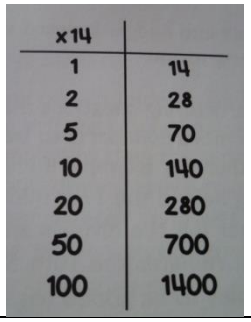
By this time children meet 4 digits by 2 digits, the only efficient method is the standard method for Long Multiplication.



	Division	
	Grouping	**Sharing**
Foundation Stage	From EYFS onwards, children need to explore practically both **grouping** and **sharing**. Links can then be made in both KS1 and KS2 between sharing and fractions.	
Stage 1	Begin by giving children opportunities to use concrete objects, pictorial representations and arrays with the support of the teacher. Use the words 'sharing' and 'grouping' to identify the concepts involved. Identify the link between multiplication and division using the array image.	
		
	 	
Stage 2	Identify Grouping as the key model for division. Relate to knowledge of multiplication facts. Use the key vocabulary: '20 ÷ 5 means how many 5's can I fit into 20?'	Identify Sharing as the secondary model of division.
		
Stage 3	Continue to give children practical images for division by grouping: e.g. use PE mats and ask children to move into groups of 4. The remainder go into a hoop. Use Numicon shapes – how many 4 pieces can I fit into 27 (made of two tens and a seven piece).	

Regularly stress the link between multiplication and division, and how children can use their tables facts to divide by counting forwards in steps.

	Chunking & Standard Methods	
	Chunking	Standard Methods
Stage 3		
	Show the children examples of chunking where the quotient includes remainders. 	
Stage 4		
Stage 5		
		

	
	
Stage 6	 Coin Multiplication can be a powerful way for children to approach division.  ×14 | 1 | 14 2 | 28 5 | 70 10 | 140 20 | 280 50 | 700 100 | 1400