This calculations policy has been developed in line with the National Curriculum (NC) for mathematics and the Calculation Guidance for Primary Schools developed by the National Centre of Excellence in Teaching Mathematics (NCETM).

The following statements from the NC have been central to the development of this policy:

- The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value
- By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

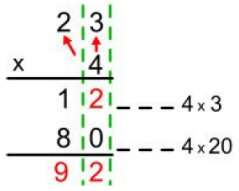
Similarly, we follow the NCETM advice that children should be "helped at an early stage to start calculating, rather than relying on 'counting on' as a way of calculating." For this reason, we have focused on developing children's ability to subitize in order to build up fluency with number bonds to 10 and then 20. These facts must be **MEMORISED** and thus, **it is essential that these skills are practised daily.**

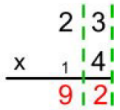
In calculating, mathematical understanding is developed through use of representations that are first of all concrete (e.g. Dienes, apparatus), then pictorial (e.g. array, place value counters) to then facilitate abstract working (e.g. columnar addition, long multiplication).

According to the NCETM, "Informal methods of recording calculations are an important stage to help children develop fluency with formal methods of recording. A noticeable difference, however, that the LPS teachers observed in Shanghai is that these **were only used for a short period, to help children understand the internal logic of formal methods of recording calculations. They are stepping stones to formal written methods**. Here is an example from a Shanghai textbook:

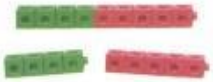
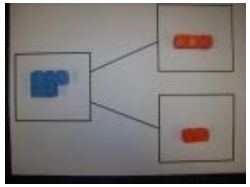
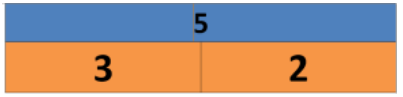
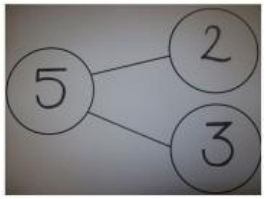
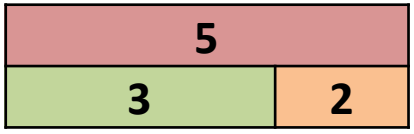
Thus, informal or 'expanded methods' are to be used only to illustrate/explain the formal method and should not be taught as an end in itself.

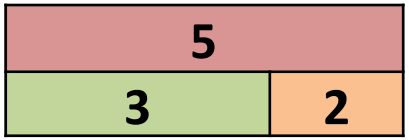
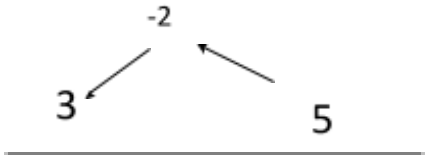
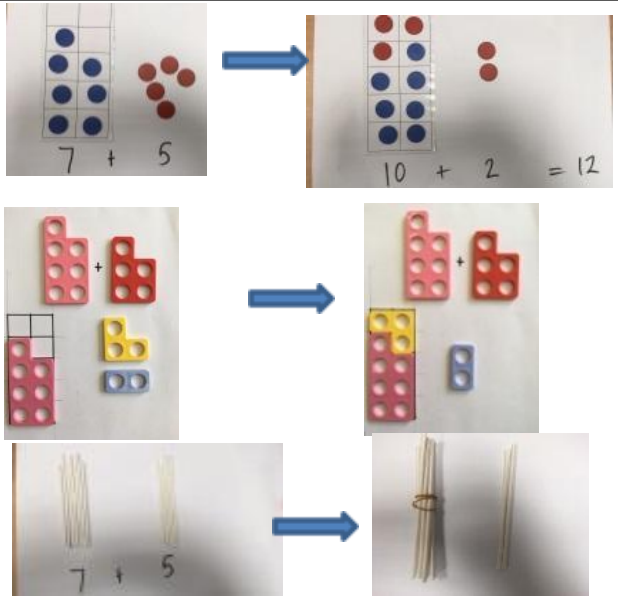
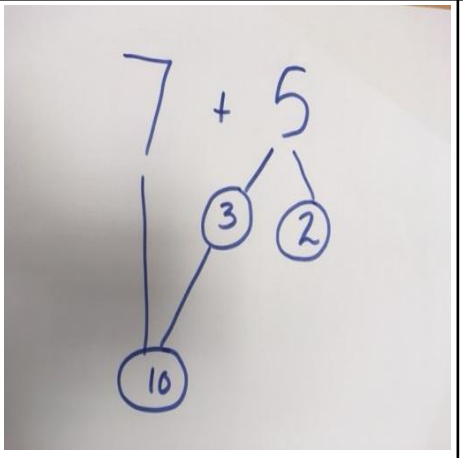
23 x 4 = ?

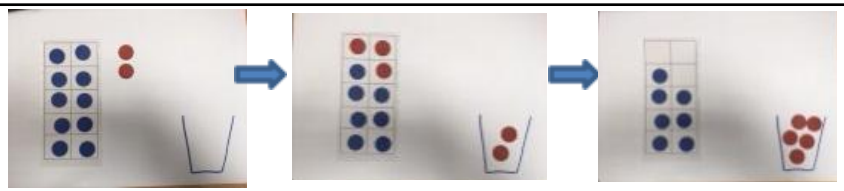
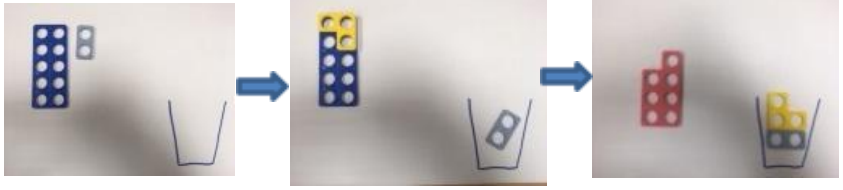
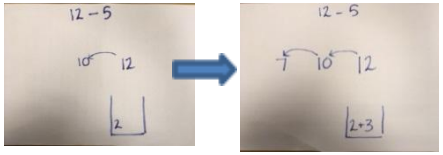
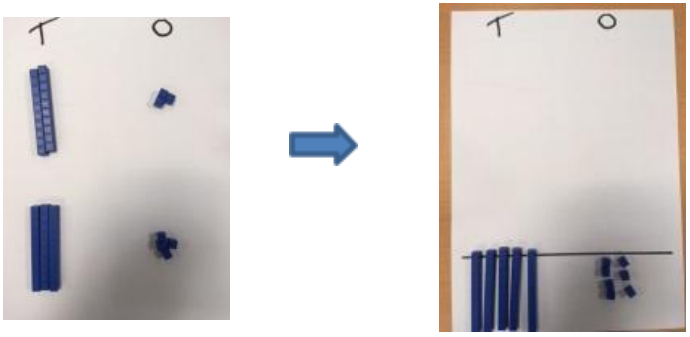
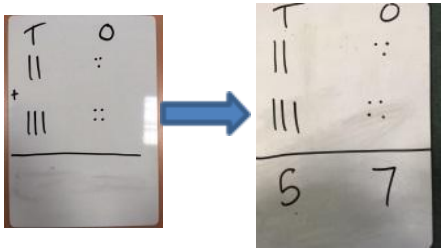
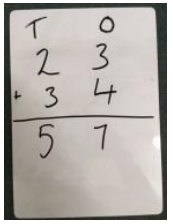
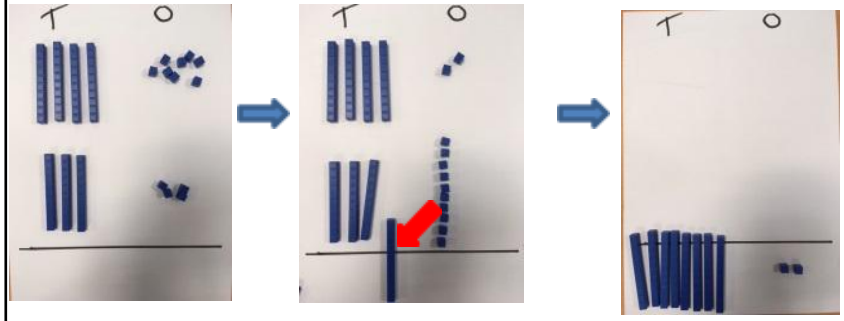
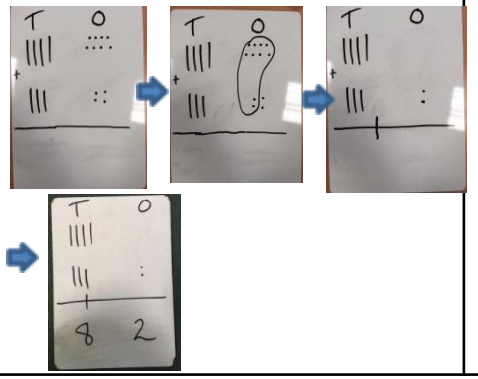
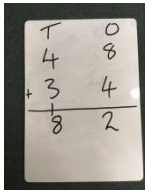


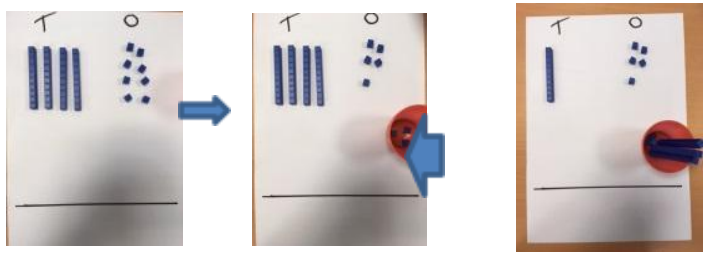
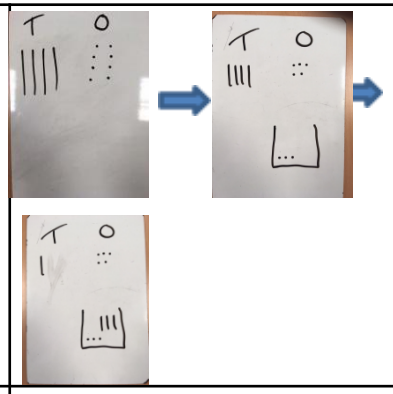
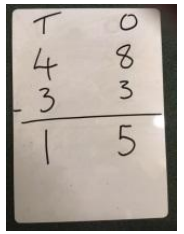
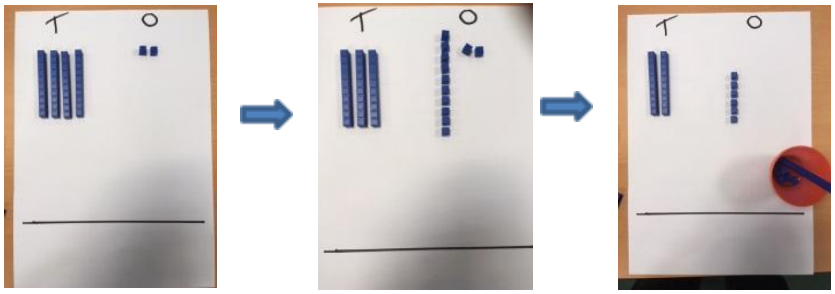
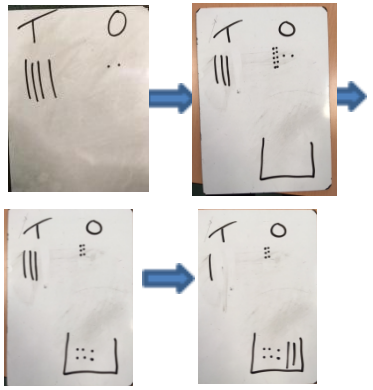
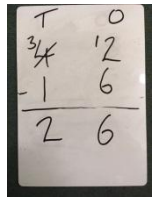
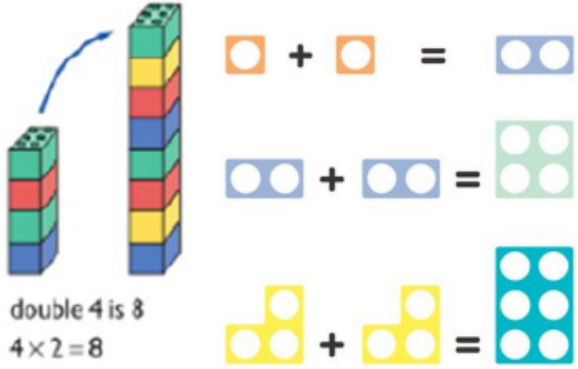


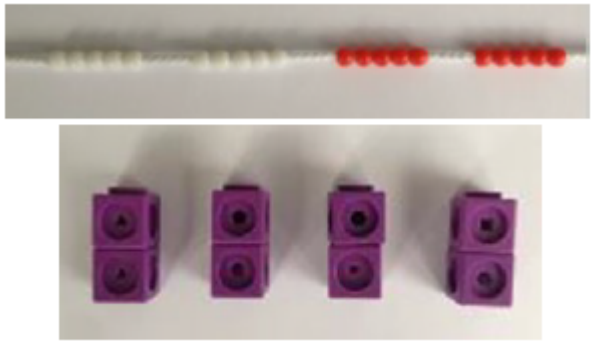
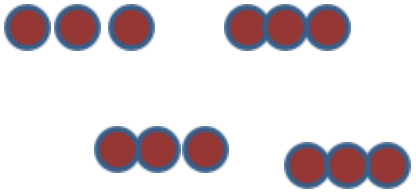
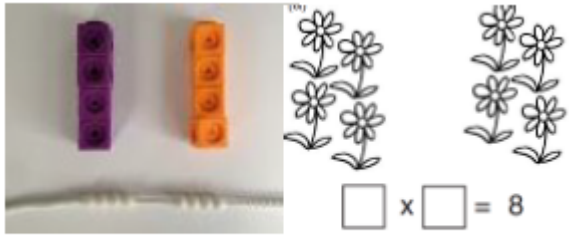
ALWAYS SHOW THE CORRESPONDENCE BETWEEN CONCRETE/PICTORIAL METHOD and FORMAL WRITTEN METHOD

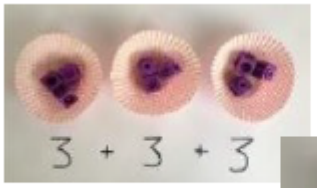
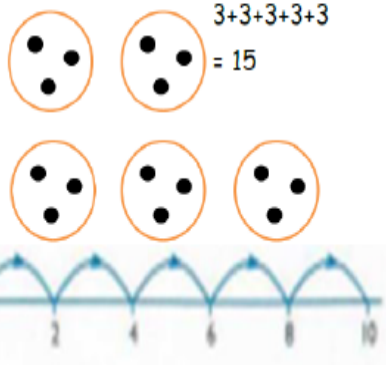
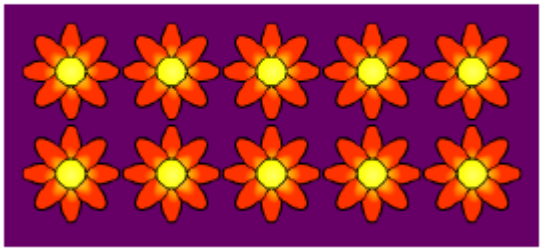
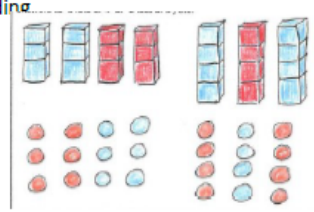
Objective	Concrete	Pictorial	Abstract
To add numbers to 10	     Children should be consistently shown *visually* that if 3+4=7 then 7-4=3 and 7-3=4	 	5 = 3 + 2 3 + 2 = 5 2 + 3 = 5 5 = 2 + 3
Interpret mathematical statements	 **Key focus is on understanding the meaning of =** What do I **add** to this side to make it balance ?  What do I **subtract** from this side to make it balance ?		5 = 3 + 2 3 + 2 = 5 2 + 3 = 5 5 = 2 + 3

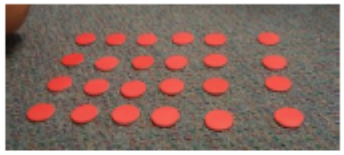
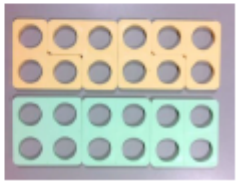
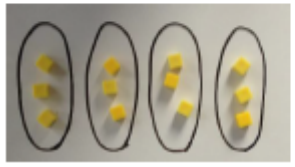
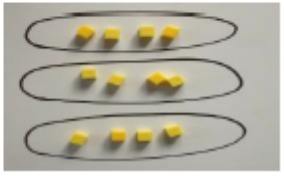
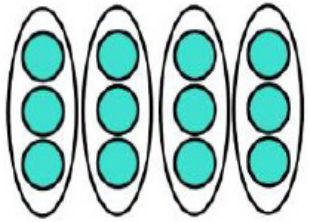
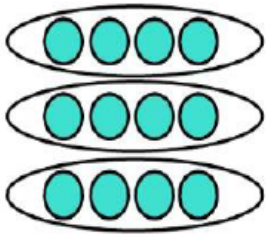
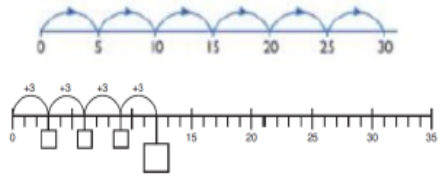
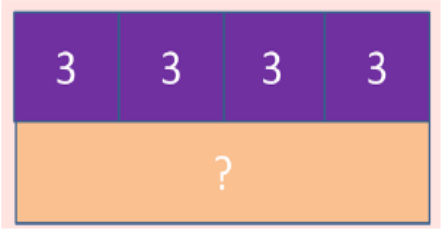
To subtract numbers to 10	e.g. 2 + 3 = 5 (is the same as) To show the corresponding subtraction facts 5 - 2 = 3 (is the same as) We could achieve the same thing by covering part of the numicon: e.g. I have 6 in the box and take 2 out – what's left ? DON'T LET THEM SEE !!	 	5 – 2 = 3 3 = 5 - 2
To add numbers across a tens boundary			7 + 5 = 12 12 = 7 + 5

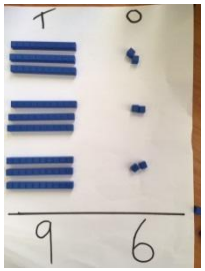
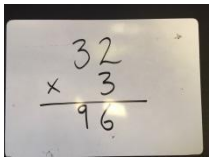
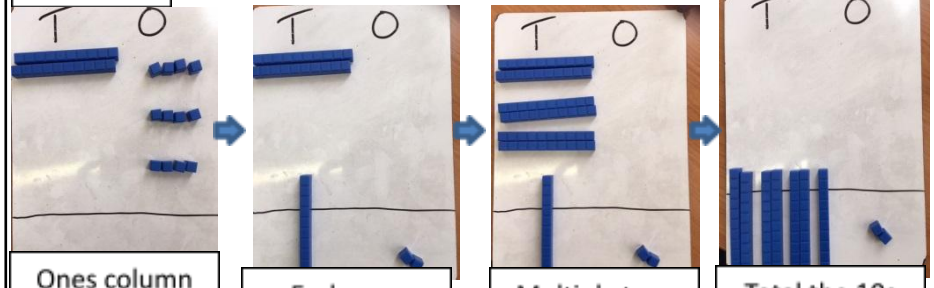
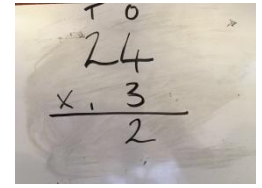
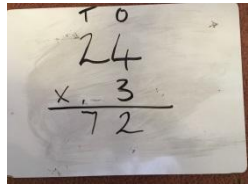
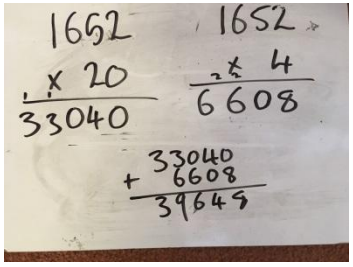
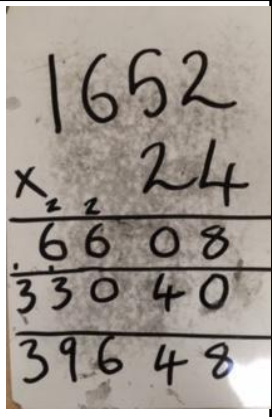
To subtract numbers across a tens boundary	 		12 – 5 = 7 7 = 12 - 5
To add 2 digit numbers (no exchange)			
To add 2 digit numbers (with exchange)			

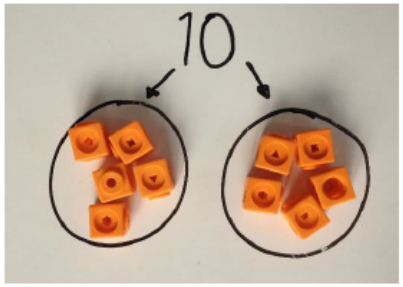
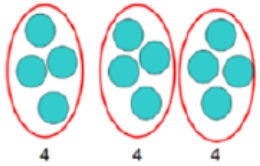
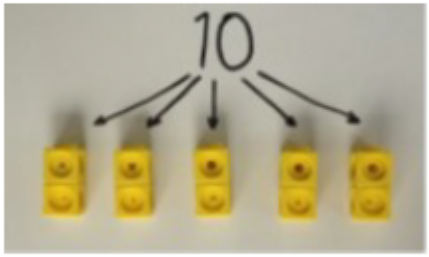
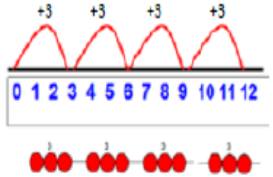
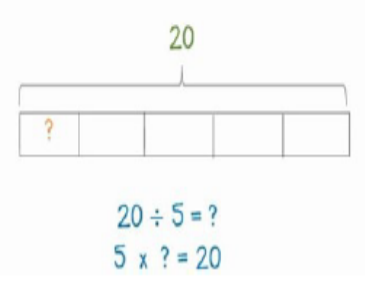
To subtract 2 digit numbers (with no exchange)			
To subtract 2 digit numbers (with exchange)			
Double single digit numbers	Use practical activities using manip-ultives including cubes and Numicon to demonstrate doubling 	Draw pictures to show how to double numbers 	4 x 2 = 8

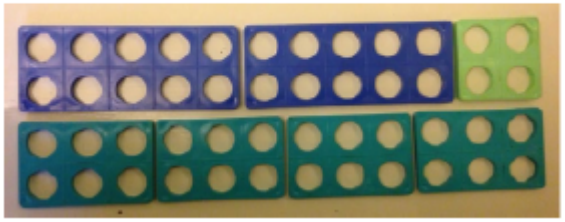
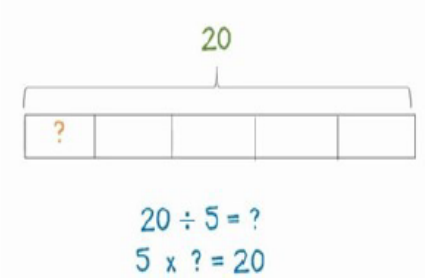
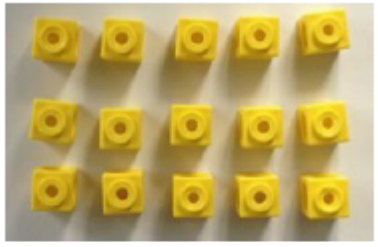
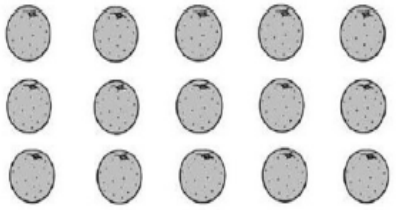
Counting in multiples			4 x 3 = 12 3 x 4 = 12
Making equal groups	 □ x □ = 8 Use manipulatives to create equal groups.	Draw  to show 2 x 3 = 6 Draw and make representations	3 x 2 = 6 2 x 3 = 6

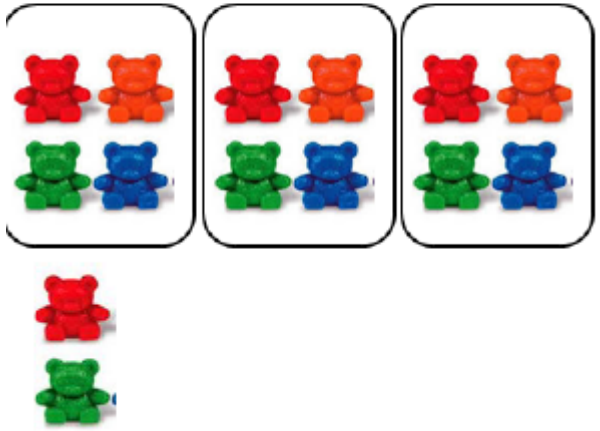
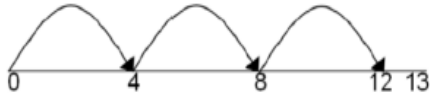
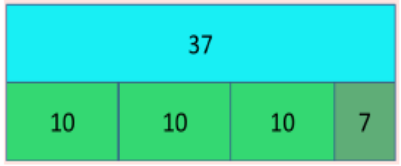
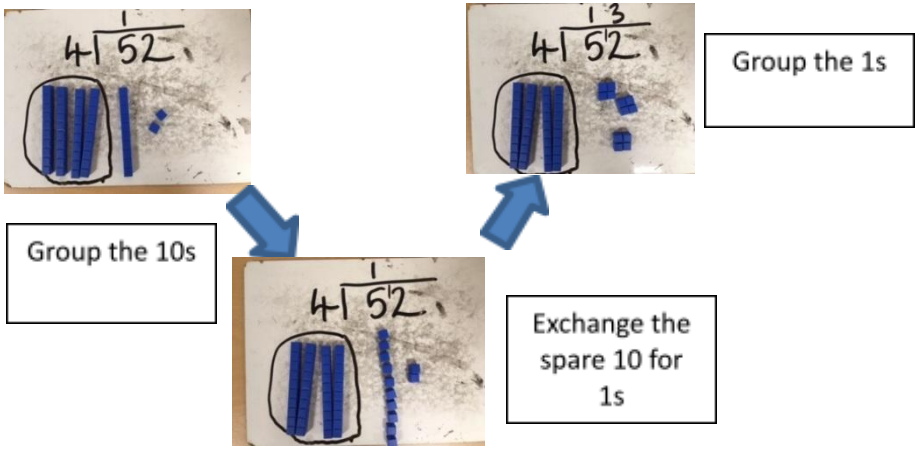
Multiplication as repeated addition	   Use different objects to add equal groups	Use pictorial including number lines to solve prob There are 3 sweets in one bag. How many sweets are in 5 bags altogether? 	5 x 3 = 15 3 x 5 = 15
Using arrays	Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc. 	Draw representations of arrays to show understanding 	4 x 3 = 12 3 x 4 = 12

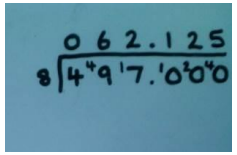
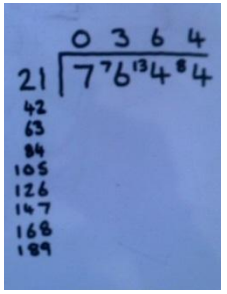
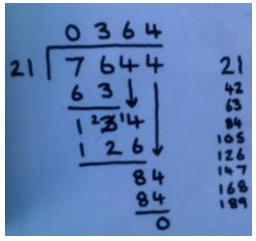
Multiplication is commutative	Create arrays using counters and cubes and Numicon.    Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.  	Use representations of arrays to show different calculations and explore commutativity.  	12 = 3 x 4 12 = 4 x 3
Counting in multiples	 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40  	 	

To multiply a two digit number by a one digit number (No exchange)	32 x 3 Show as 3 **lots of** 32  Secure the habit of multiplying the ones column **FIRST**		
To multiply a two digit number by a one digit number (With exchange)	24 x 3  Ones column **FIRST** Exchange Multiply tens Total the 10s		 
Multiply a 3 or 4 digit number by a 2 digit number		Preparatory step (see notes above)  	

Division as sharing	 	Children use pictures or shapes to share quantities.  8 shared between 2 is 4 Sharing:  12 shared between 3 is 4	12 ÷ 3 = 4 12 ÷ 4 = 3
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.  	Use number lines for grouping  **12 ÷ 3 = 4** Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group. 	

Division as grouping (continued)	Use cubes, counters, objects or place value counters to aid understanding.  24 divided into groups of 6 = 4 96 ÷ 3 = 32 	Continue to use bar modelling to aid solving division problems. 	How many groups of 6 in 24? 24 ÷ 6 = 4
Division with arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	Draw an array and use lines to split the array into groups to make multiplication and division sentences 	Show links between division and multiplication facts 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7 28 = 7 x 4 28 = 4 x 7 4 = 28 ÷ 7 7 = 28 ÷ 4

Division with remainders	14 ÷ 3 = Divide objects between groups and see how much is left over 	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.  Draw dots and group them to divide an amount and clearly show a remainder.  Use bar models to show division with remainders.  	28 ÷ 5 = 5 r 3
Short Division	 		2 1 8 4 | 8 7 2 3 8 6 r 2 5 | 4 3 2 3

Division by a single digit – extending to showing remainders as decimals			
Division by a two digit number (long and short method)			  Encourage children to work out the timetable for the divisor