Calculation Policy

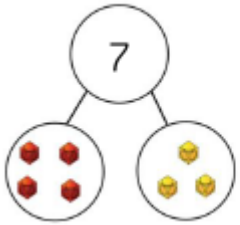
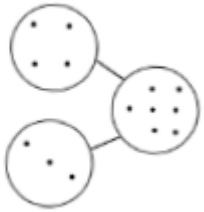
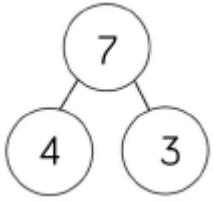
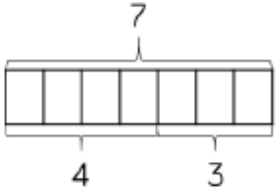
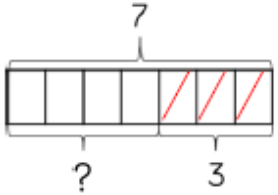
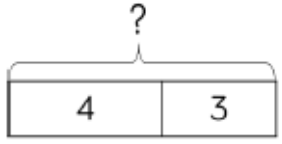
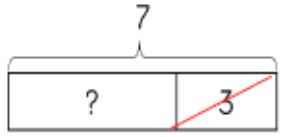
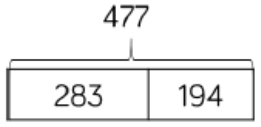
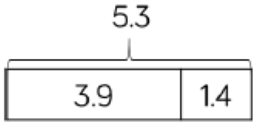
Saint Peter's Mission Statement

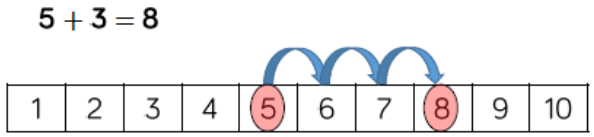
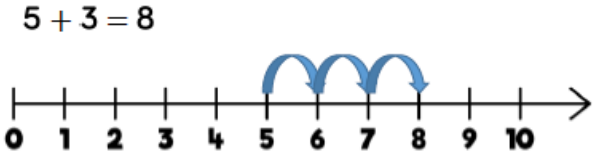
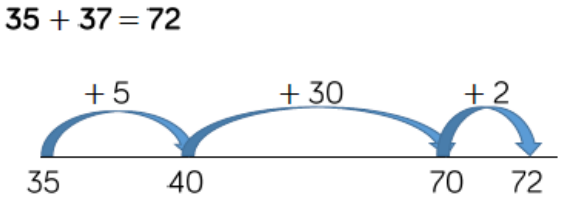
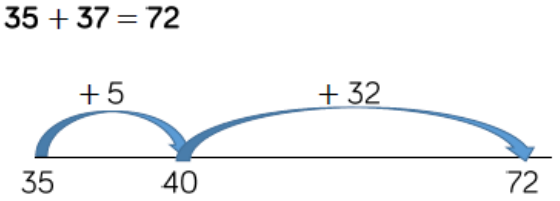
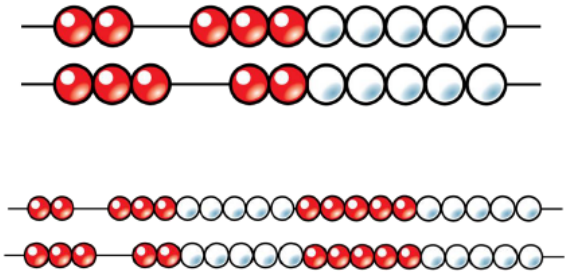
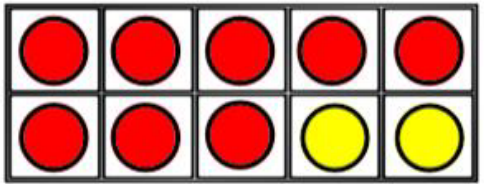
One Family, Aiming High, Learning Together with God.

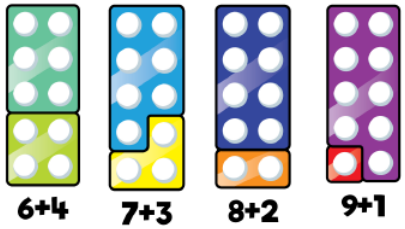
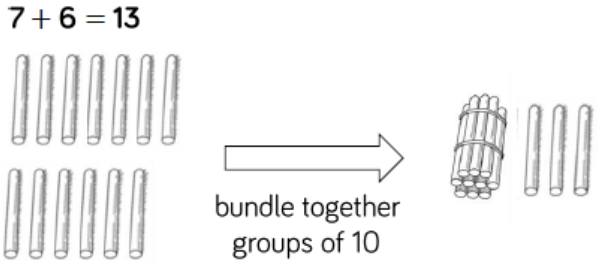
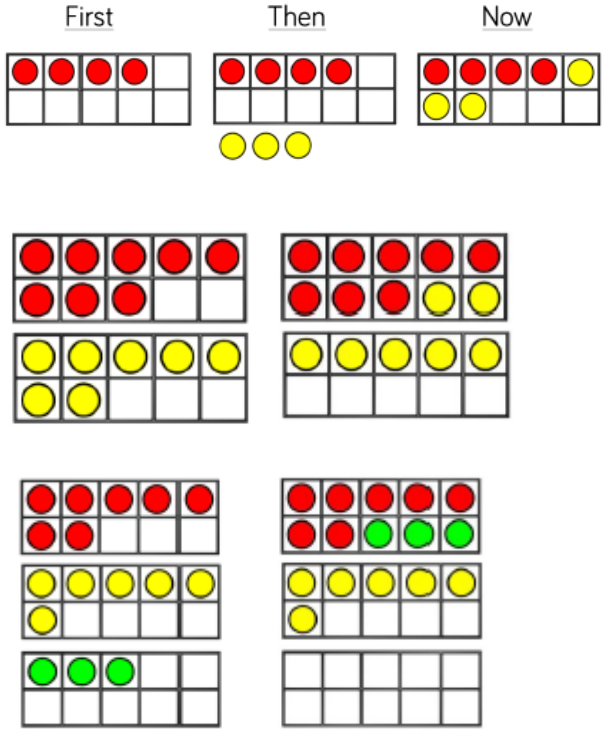
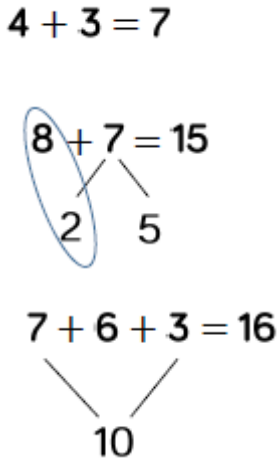
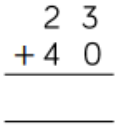
Saint Peter's Maths Vision

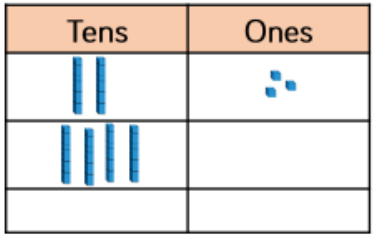
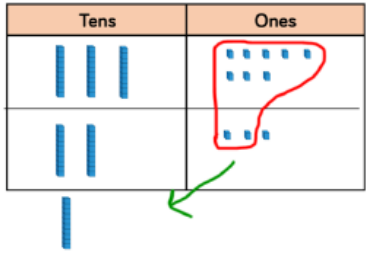
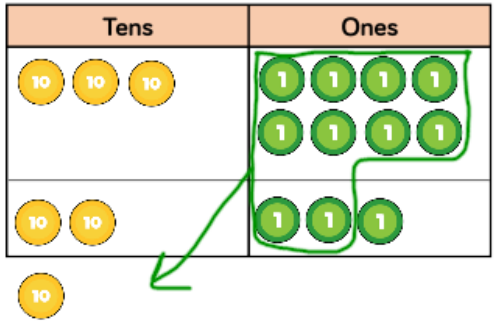
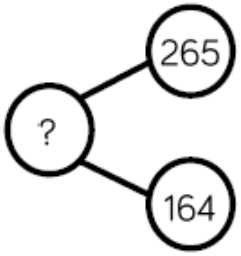
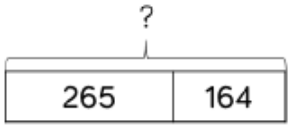
Grow Enthusiastic, Confident and Flexible Thinking Mathematicians.

Addition

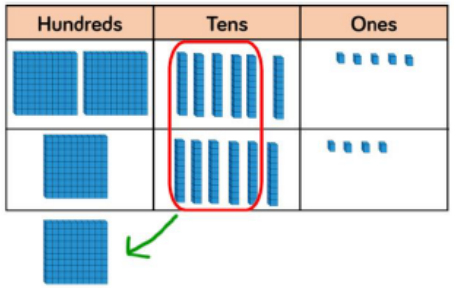
Concrete	Pictorial	Abstract
Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears etc.)  $7 = 4 + 3$  $7 = 3 + 4$ 	Represent using part whole model (cherry diagram).  	4 + 3 = 7 (four is a part, 3 is a part and the whole is seven).  $7 = 4 + 3$ $7 = 3 + 4$
Bar Model to Combine Two Wholes Using cubes or counters.  	Using a number line to represent missing values.   	Using an abstract number line to represent missing values.    

Counting On Using objects. Number lines by using cubes, counters, number tracks, numicon or bead strings. 	Labelled Number Lines 	Blank Number Lines Jumping to the nearest multiple of 10, 100, 100 etc.  
Bonds to Ten Using bead strings, numicon, cubes. 	Using tens frames 	8 + 2 = 10 2 + __ = 10

		
Regrouping to Make 10 by using straws, ten frames and counter/cubes or using numicon 	Children to use the tens frame pictorially. 	Children to develop an understanding of equality. E.g. 6 + ☐ =11 and 6 + 5 = ☐ 6 + 5 = ☐ + 4 
Adding Two, Two Digits Numbers- No exchange Continue to develop understanding of partitioning and place value and use this to support addition.	Children to represent with counters in a place value grid.	

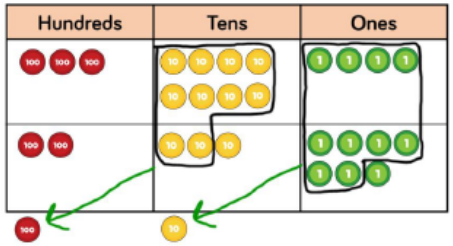
 2 3 + 4 0		
Adding Two, Two Digits Numbers- with exchanging Continue to develop understanding of partitioning and place value and use this to support addition.  38 + 23 61 1	Children to represent with counters.  If the children are completing a word problem, draw a bar model or part whole model to represent what it's asking them to do.  	Looking for ways to make 10 30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61 Formal method: 36 +25 61 1

Use of place value counters to add HTO + TO, HTO + HTO etc.
Once children have had practise with this, they should be able to apply it to larger numbers and the abstract.

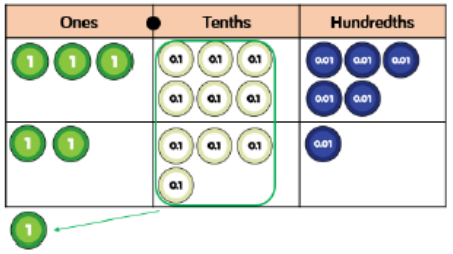


$$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$$

Children to represent with counters.



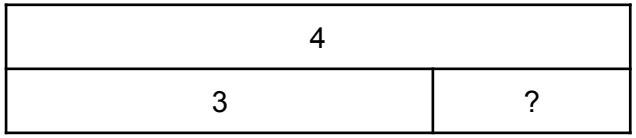
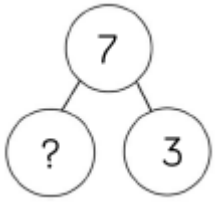
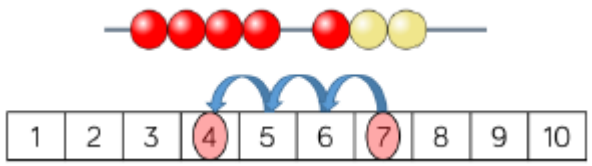
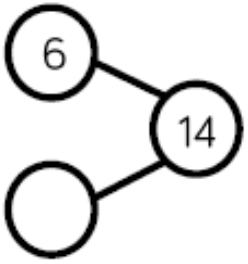
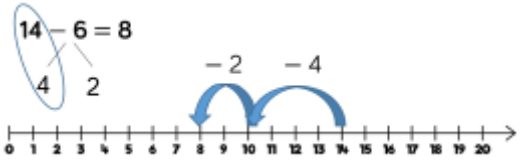
$$\begin{array}{r} 384 \\ +\ 237 \\ \hline 621 \\ \hline 1\ 1 \end{array}$$

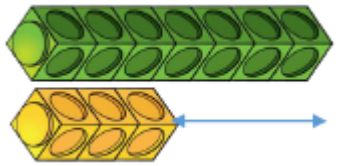
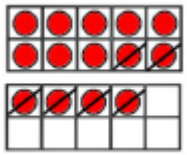
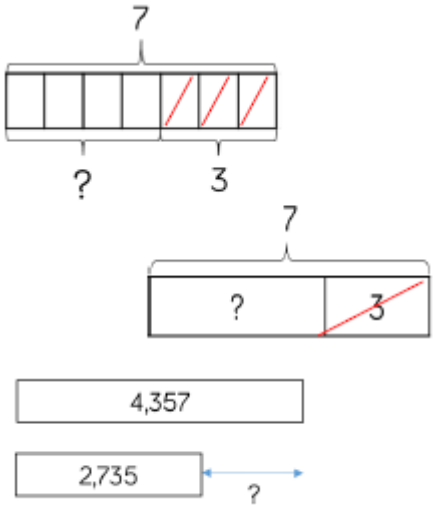
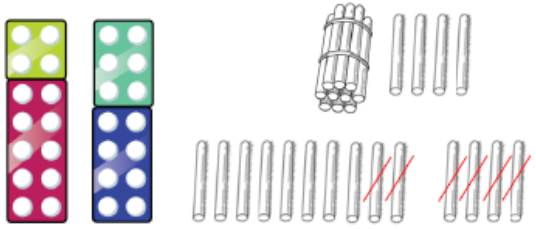
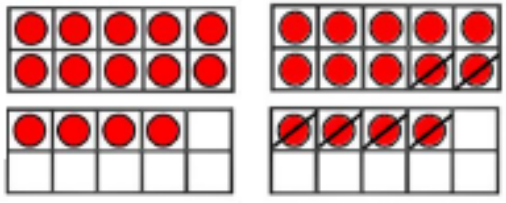
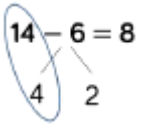


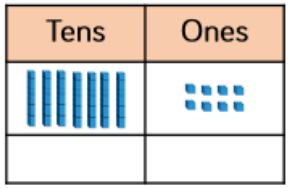
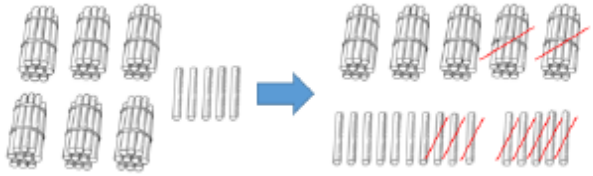
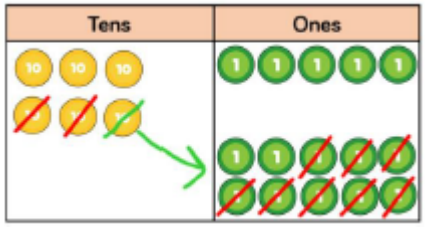
$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$$

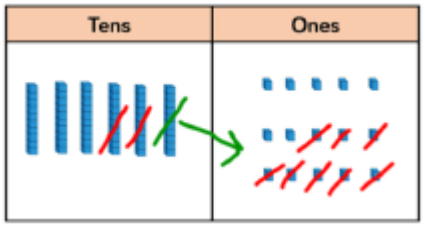
$$\begin{array}{r} 384 \\ +237 \\ \hline 621 \\ 1\ 1 \end{array}$$

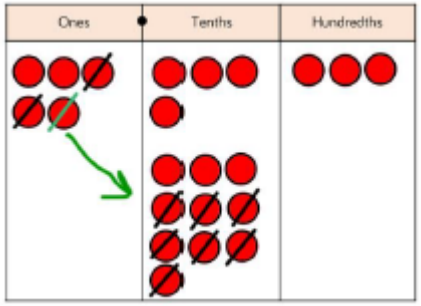
Subtraction

Concrete	Pictorial	Abstract
Physically Taking Away and Removing Objects from a Whole (use various objects) rather than crossing out- children will physically remove the objects.	Children to draw the concrete resources they are using and cross out.	4 - 3 = □= 4 - 3  
Counting Back Using number lines or number tracks, bead strings etc. 	Children to represent what they see pictorially or using a bar model/part whole diagram.  	Counting back on a number line. 

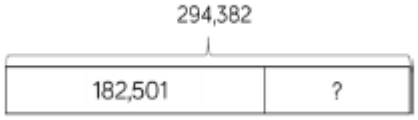
Find the Difference (using cubes, numicon or Cuisenaire rods, other objects can also be used). 	Children to draw the cubes/other concrete objects which they have used  Use of a bar model 	Find the difference between 8 and 6. 8 - 6, the difference is ? Children to also explore why 9 - 7 = 8 - 6 (the difference, of each digit, has changed by 1 do the difference is the same- this will help when solving 10000 - 9987)
Making 10 Using numicon, ten frames or straws. 	Children to present the ten frame pictorially and cross out. 	14 - 6 = 8 You also want children to see related facts e.g. 14 - 4 = 10 10 - 2 = 8 Children to represent how they have solved it e.g. 

Column Method- No Exchange Using base 10  78 minus 34 = _____ 8 ones – 4 ones = _____ 7 tens – 3 tens = _____ We have _____ tens and _____ones.	Using place value counters.	48 - 7 = TO 48 - 7 41
Column Method- With Exchanging Using straws:  Using Base Ten: 45 - 26 1) Start by partitioning 45 2) Exchange one ten for ten more ones 3) Subtract the ones, then the tens	Using place value counters. Once the children have had practice with the concrete, they should be ab;e to apply it to any subtraction.  	It's crucial that the children understand that when they have exchanged the 10 they still have 45. 45 = 30 +15 3 1 ~~4~~5 - 26 19

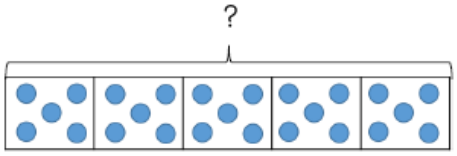
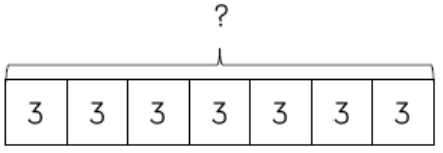
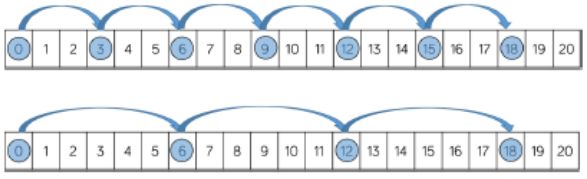
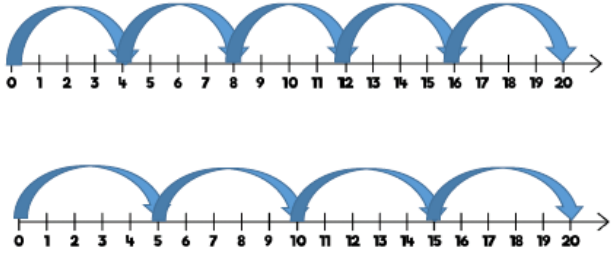
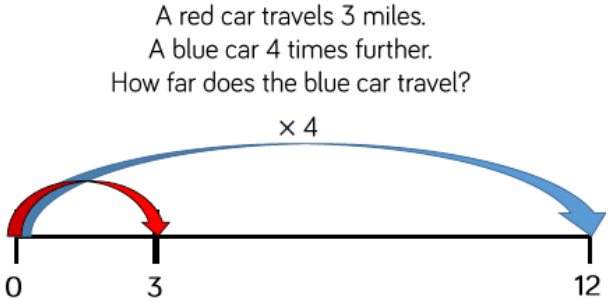


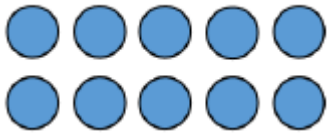
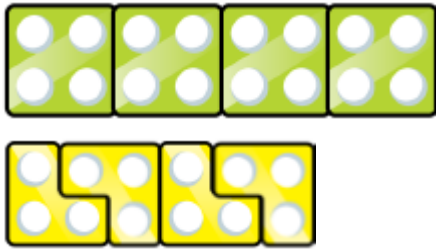
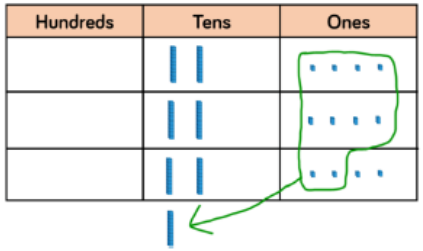


When solving word problems, children to use bar model or part whole model to represent the problem.



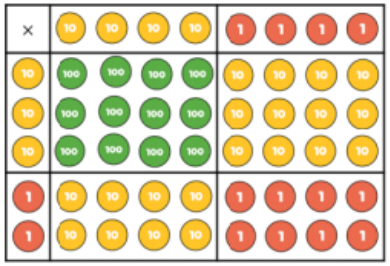
Multiplication

Concrete	Pictorial	Abstract
Repeated Grouping/Repeated Addition Using objects 3 x 4 or 3 lots of 4  $5 \times 4 = 20$ $4 \times 5 = 20$	Children to represent the practical resources in a picture e.g. **XX XX XX** **XX XX XX** Use of a bar model for a more structured method  $5 \times 5 = 25$	3 x 4 4 + 4 + 4  $3 \times 7 = 21$ $7 \times 3 = 21$
Repeated Grouping/Repeated Addition Use number tracks to show repeated groups of 3  $6 \times 3 = 18$ $3 \times 6 = 18$	Labelled Number Lines  $4 \times 5 = 20$ $5 \times 4 = 20$	Abstract number line 3 x 4 = 
Arrays Use arrays to illustrate commutativity (counters and other objects can be used).	Children to draw the arrays	Children to be able to use an array to write a range of calculations e.g. 2 x 5 = 10

2 x 5 = 5 x 2 		5 x 2 = 10 2 + 2 + 2 +2 + 2 = 10 5 + 5 = 10
Partition to Multiply (use numicon, base 10, Cuisenaire rods) 4 x 43 	Children to represent the concrete manipulatives in a picture e.g. base 10 can be represented as: 4 x 40 IIII 4 x 3 Xxxxxxxxxxx = Ixx = Ixx	Children to be encouraged to show steps they have taken. 4 x 15 10 5 10 x 4 = 40 5 x 4 = 20 40 + 20 = 60 A numberline can also be used
Formal Column Method- Base Ten With place value counters or base 10 (at the first stage- start with no exchanging)  24 × 3 72 1 3 x 24 Make 24, 3 times. See how many ones, then how many tens.	Children to represent base 10 in a place value grid.	Children to record what it is they are doing to show understanding. × 200 30 4 30 6,000 900 120 2 400 60 8

Formal Column Method- Place Value Counters
(children need this stage, initially, t understand how the column method works)

$$\begin{array}{r} 34 \\ \times\ 5 \\ \hline 170 \\ \hline 1\ 2 \end{array}$$



$$\begin{array}{r} 44 \\ \times\ 32 \\ \hline 8 \\ 80 \\ 120 \\ +\ 1200 \\ \hline 1408 \\ \hline 1 \end{array}$$

Children to represent the counters in a place value grid.

6 x 23
6 x 3 = 18
6 x 20 = 120
120 + 18 = 138

The aim is to get to the formal method but the children need to understand how it works.

6 x 23 =

$$\begin{array}{r} 23 \\ \times\ 6 \\ \hline 138 \\ \hline 1\ 1 \end{array}$$

When the children start to multiply 3 digit x 3 digit and 4 digit by 2 digit etc. they should be confident with the abstract:

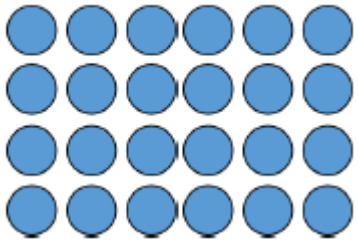
To get 744 children have solved 6 x 124
To get 2480 they have solved 20 x 124

$$\begin{array}{r} 124 \\ \times\ 26 \\ \hline 744 \\ 1\ 2 \\ 2480 \\ \hline 3224 \\ \hline 1\ 1 \end{array}$$

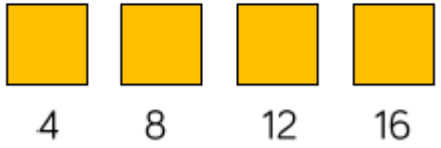
Answer: 3224

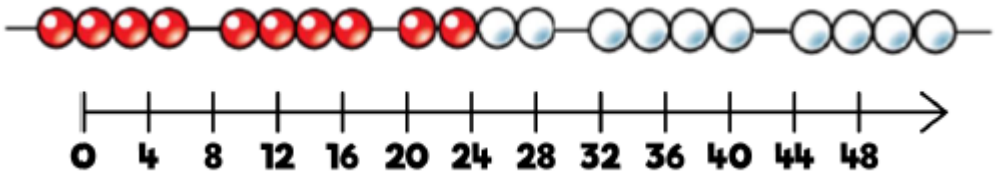
Times Tables

Practise regularly making links to other times tables (2x in the 4x tables). Use various representations to support looking for patterns.



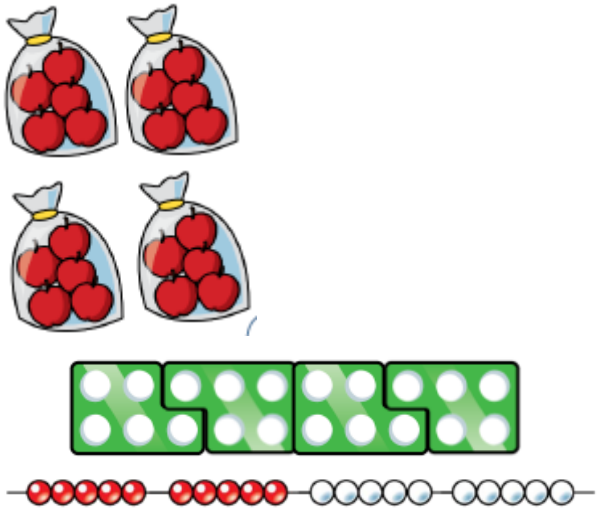
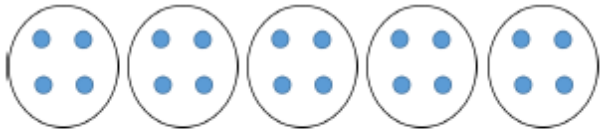
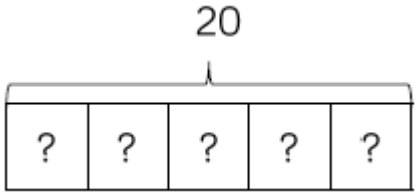
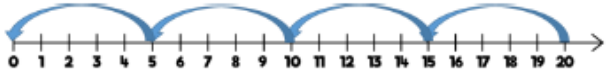
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50



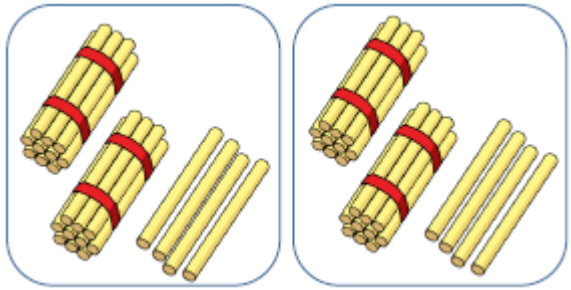


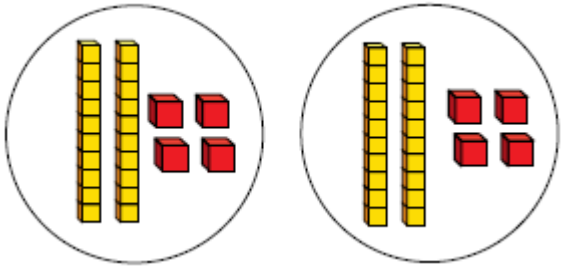
4	8	12	16	20
24	28	32	36	40
44	48	52	56	60

Division

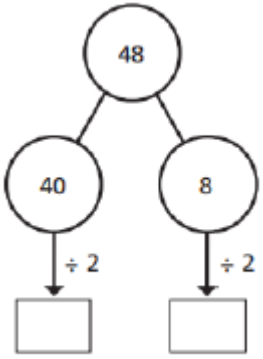
Concrete	Pictorial	Abstract
Equal Sharing 20 shared between 5 (other concrete objects can be used e.g. children and hoops, teddy bears, cakes and plates) 	 $20 \div 5 = 4$ This can also be done in a bar so all 4 representations have a similar structure.  Or a number line. 	$6 \div 2 = 3$ What's the calculation? 3 | 3

2 Digit ÷ 1 Digit- No Exchange

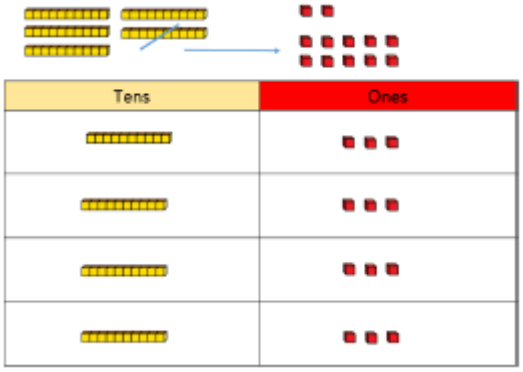




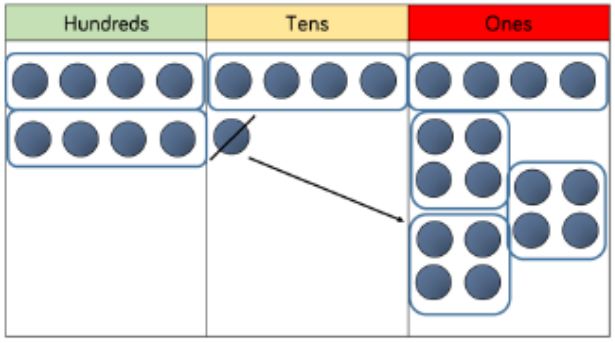
Tens	Ones
10 10	1 1 1 1
10 10	1 1 1 1



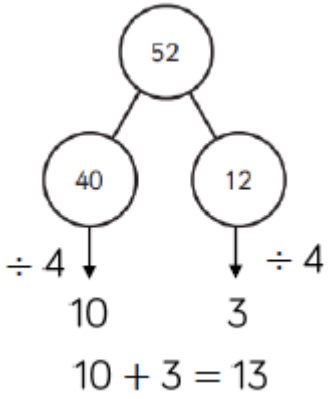
2 or 3 Digit ÷ 1 Digit- with Exchange
Using base 10 or place value counters.

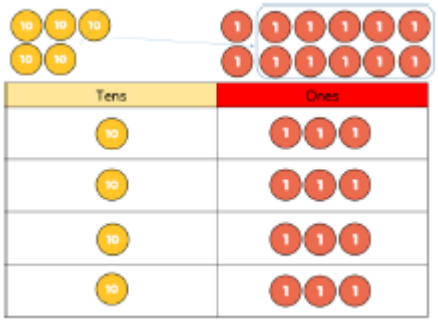


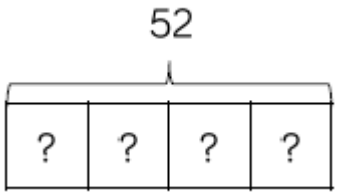
Children to have the opportunity to represent resources they use in a pictorial way.

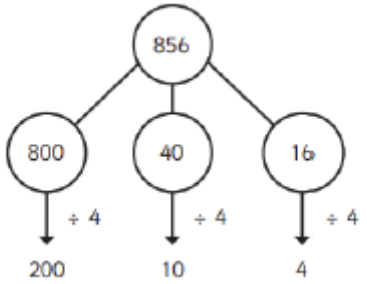


Children to represent word problems using bar model or part whole model.

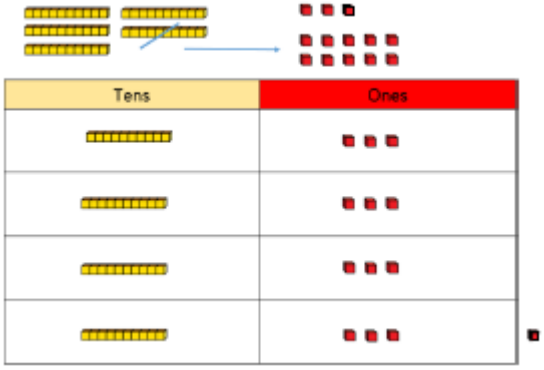


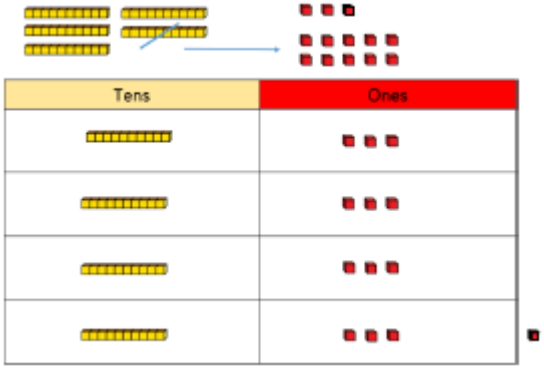


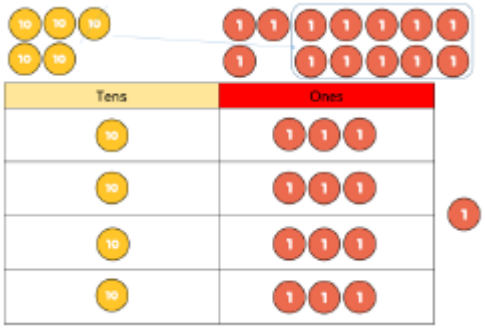


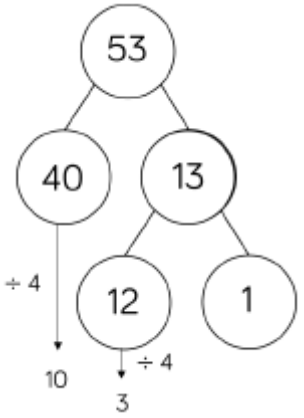


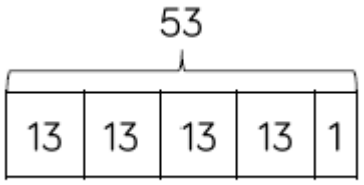
2 or 3 Digit ÷ 1 Digit- Sharing with Remainders

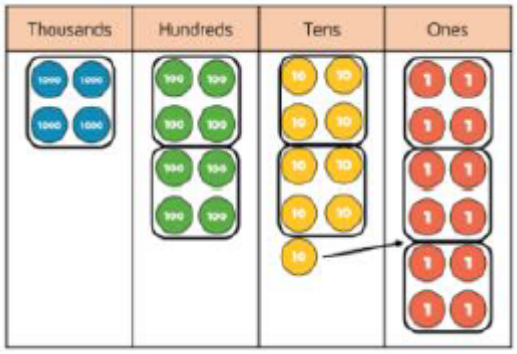










Use of the 'Bus Stop Method' Using grouping and counters. Key language for grouping- how many groups of X can we make with X hundreds? - this can also be done using sharing.  4892 ÷ 4 Step 1: Make 4892 Step 2: Circle your groups of 4 Step 3: Exchange 1 ten for 10 ones and circle groups of 4	This can easily be represented pictorially, until the children can no longer do it. It can also be done to decimal places if you have a remainder.	1223 4 | 4892 (1) | | 0 | 4 | 8 | 9 | | --- | --- | --- | --- | --- | | 15 | 7 | 7 3 | 13 3 | 13 5 |
Long Division Using place value counters the below steps can be used. *Note: CPA may not be followed for long division*. 2544 ÷ 12 How many groups of 12 thousand do we have? None Exchange 2 thousand for 20 hundredths	Children to represent the counters, pictorially and record their subtractions underneath.	

How many groups of 12 are in 25 hundreds?
2 groups.
Circle them.
We have grouped 24 hundreds so can take them off and we are left with one.

Exchange the one hundred for ten tens so now we have 14 tens.
How many groups of 12 are in 14?
1 remainder 2.

Exchange the two tens for twenty ones so now we have 24 ones. How many groups of 12 are in 24?
2

4,320 ÷ 32 = 135

32	64	96	128	160	192

		1	3	5
32	4	3	2	0
−	3	2		
	1	1	2	
−		9	6	
		1	6	0
−		1	6	0
				0

			2	4	r	1	2
1	5	3	7	2			
	−	3	0	0			
			7	2			
	−		6	0			
			1	2			

$1 \times 15 = 15$
$2 \times 15 = 30$
$3 \times 15 = 45$
$4 \times 15 = 60$
$5 \times 15 = 75$
$10 \times 15 = 150$