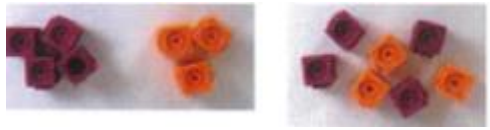
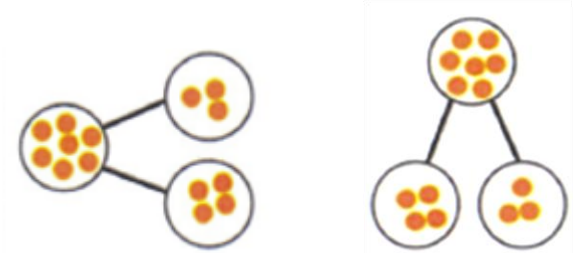
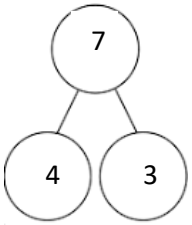
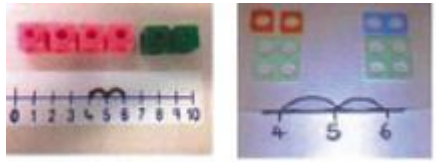
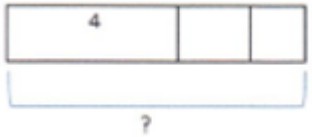
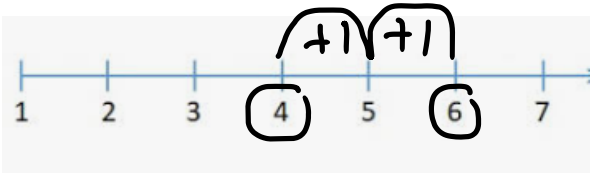
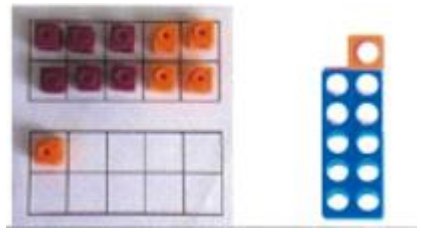
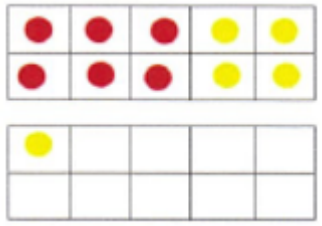
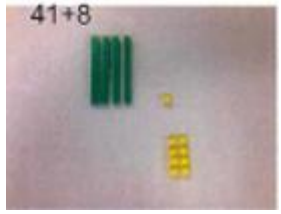
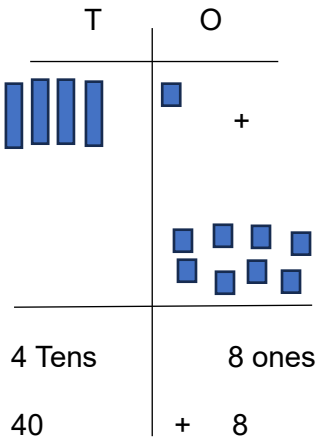
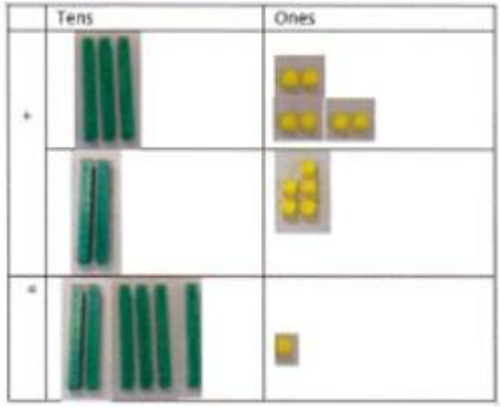
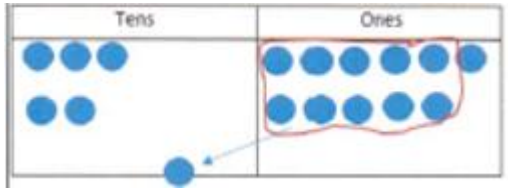
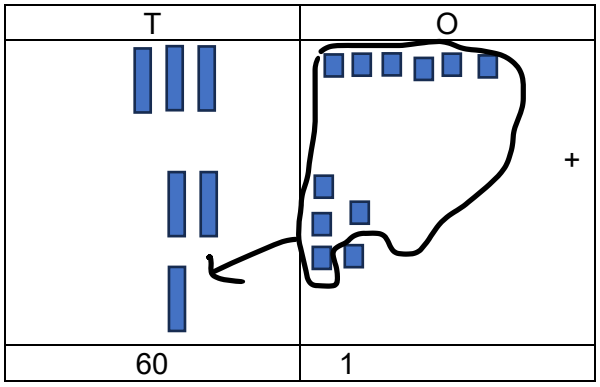
Maths
Calculation Policy

Addition:

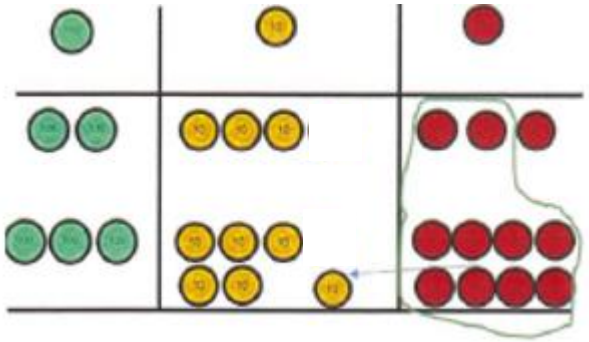
Key language to be used: sum, total, add, parts and wholes, plus, altogether, 'more than', 'is equal to', 'is the same as'.

Concrete	Pictorial	Abstract
Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears etc.) 	 This Part Whole model can face any direction.	4 +3 = 7 (four is a part, 3 is a part and the whole is seven) 
Counting on using number lines by using cubes or Numicon. 	A Bar Model encourages children to count on. 	The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What's the total of 2 and 4? 
Regrouping to make 10 by using Ten Frames and counters/cubes or using Numicon: 6 + 5 = 	Children to draw the Tens Frame and counters/ cubes. 6 + 5 = 	Children to develop and understanding of equality e.g. 6 + ? = 11 and 5 + ? = 11 6 + 5 = 4 + ?

T + O using Base 10. (T = tens O= ones) Continue to develop understanding of partitioning and place value.  	Children to represent the concrete using a particular symbol e.g. rectangles for tens and squares for ones.  	Children can partition the number to add. 40+ 0 = 1 + 8 = Or Use the Column Method 4 1 + 8 _____ _____
TO + TO using Base 10. Continue to develop understanding of partitioning and place value and use this to support addition. Begin with NO exchange. 36 + 25  	This could be done in more than one way.   	36 + 25 = 30 + 20 =50 6 + 5 = 11 36+ 25 61 1

Use of place value counters to add HTO + TO, HTO + HTO etc.
Again, start without carrying.

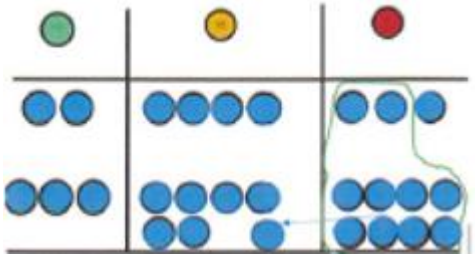
233+ 358 =



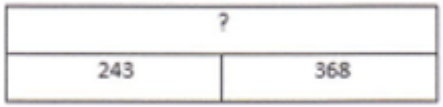
5 9 1

There are 11 ones so you take 10 ones and they make 1 ten.

Children to represent the counters e.g. like the image below.



If the children are completing a word problem, draw a bar model to represent what it's asking them to do.



James has 243 sweets, Ben has 368. How many do they have altogether?

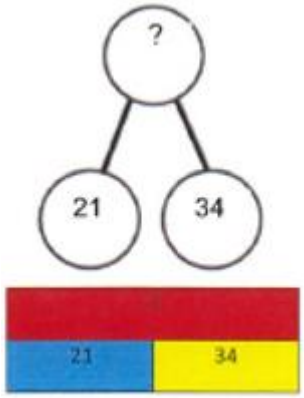
Formal Method

HT0
243
338+
581

1

We carry the new ten under the ten's column.

Fluency Variation, different ways to ask children to solve 21 + 34



Sam saved £21 one week and another £34 the next week. How much did he save in total?

21+34 = 55 Prove it!

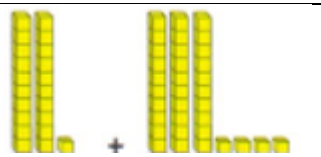
(Reasoning but the children need to be fluent representing this.)

21+
34

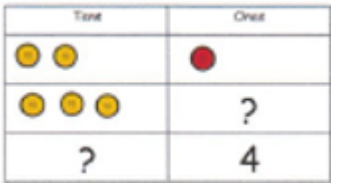
? = 21 + 34

21 + 34 =

What's the sum of twenty-one and thirty-four?

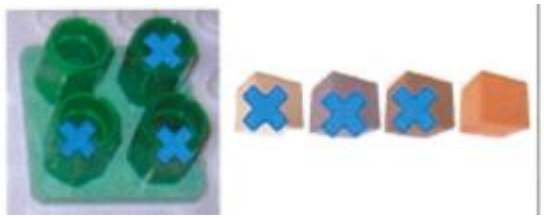
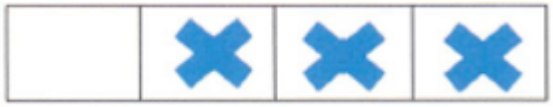
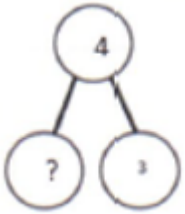
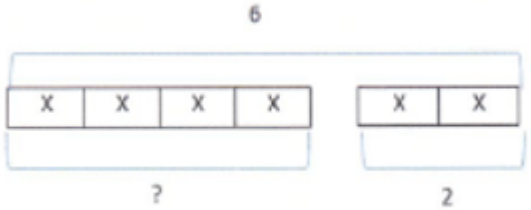
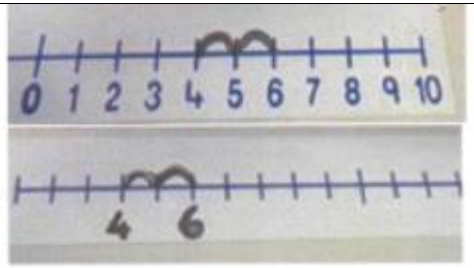
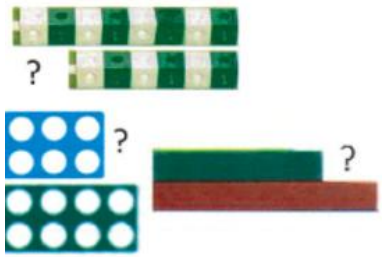
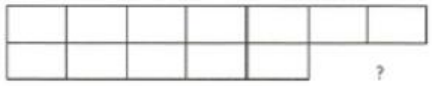


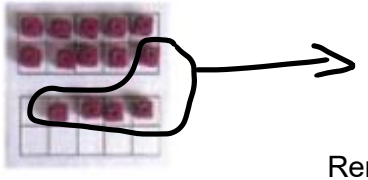
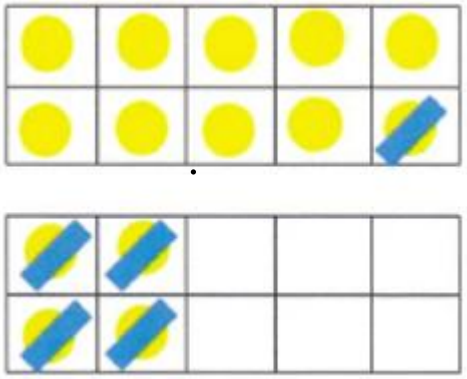
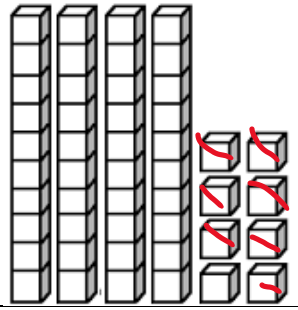
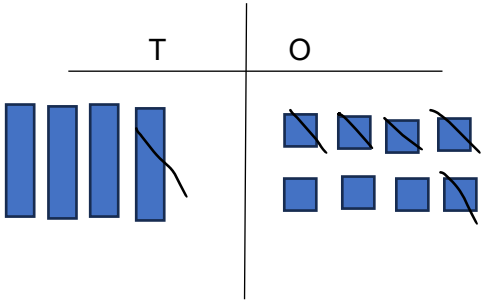
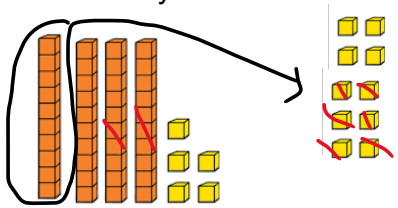
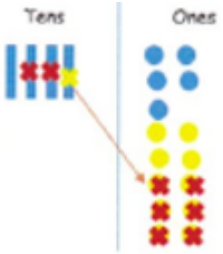
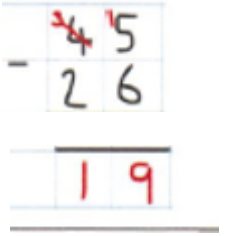
Always use missing digit problems too.



Subtraction

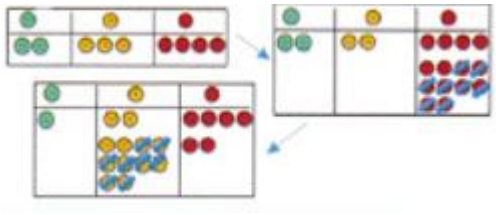
Key language which should be used: take away, less than, the difference, subtract

Concrete	Pictorial	Abstract
Physically taking away and removing objects from a whole (use various objects too) rather than just crossing out. 4 - 3 = 1 	Children to draw the concrete resources they are using and crossing out.  Use of the Bar Model: 	4 - 3 = □ = 4 -3 
Counting back (using number lines or number tracks) 	Children represent what they see pictorially. E.g. 	 Children may draw their own number lines
Finding the difference (using Numicon or Ten Frames)  14- 5 =	Children to draw the cubes/ other concrete objects which they have used. XXXXXXXX XXXXXX Use of the bar model 	Find the difference betwenn 8 and 6. 8-6 the difference is ? Children to also explore why 9-7 = 8-6 (difference, of each digit, has changed by 1 so the differene is the same) This will help with numbers like 1000- 567 You would take 1 away from each to make 999-566.

Making 10 (using Numicon or Tens Frames) 14-5 =  Remove the 5.	Children to present the Ten Frame pictorially. 	15 - 5 = 10 You want children to see related facts e.g. 14 - 5 =9 16 - 5 = 11
Column Method (using base 10) 48-7 = 41 	48 – 15= 	48 - 17 = 48 17- 31
Column Method (using Base 10 and having to exchange) 45- 26 = 19 1. Partition the numbers into Tens and ones. 2. Borrow a Ten and make it 10 ones. 3. Then take away the 26. 	Represent the base 10 pictorially. 	Its crucial that the children understand that when they have exchanged the 10 they still have 45. 45= 30+15 

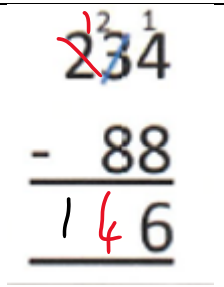
Column method (using place value counters)

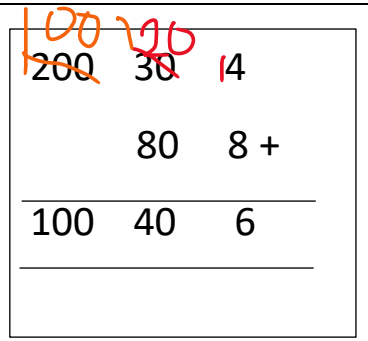
234-88=



Once the chidlren have had practise with the concrete, they should be able to apply it to any subtraction.

Like the other pictorial representations, chidlren to represent the counters.

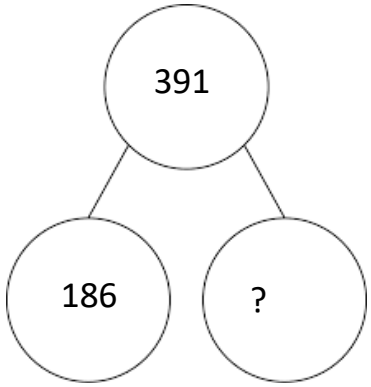




1. You can't take 8 from 4 so you have to borrow a ten from the 3 (tens column) and leave 2.
   14-8 = 6
2. Then you can't to 2-8 you borrow 100 from the hundreds column.
   12- 8 = 4
3. Then you look at the 100s column.
   100- 0 = 100.

Fluency Variation, different ways to ask children to solve 391-186:

391	
186	?



Raj spent £391, Tim spent £186. How much more did Raj spend?

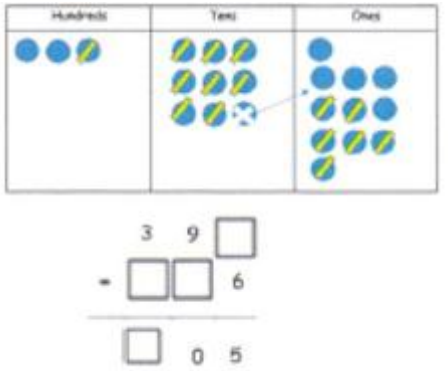
I had 391 metres to run, after 186 metres I stopped running. How many meters do I have left to run?

391- 186= 205

? = 391 – 186

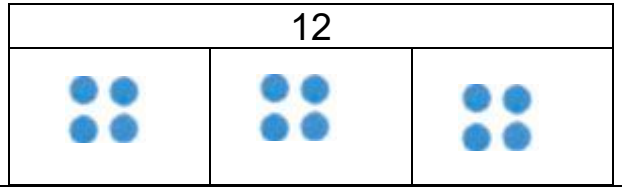
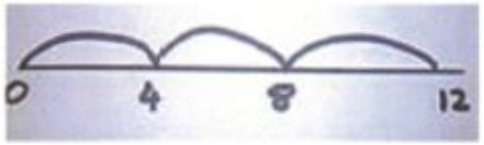
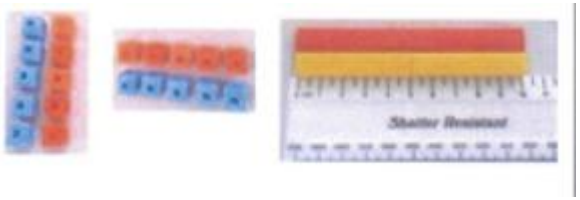
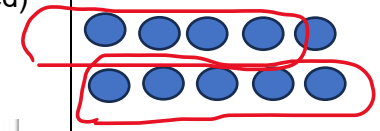
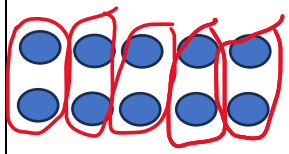
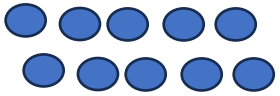
Find the difference between 391 and 186. Subtract 186 form 391. What is 186 less than 391?

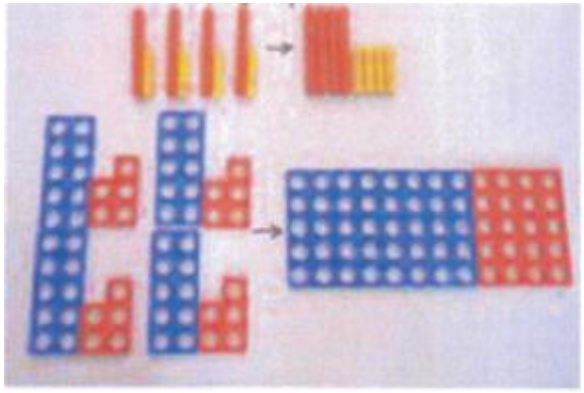
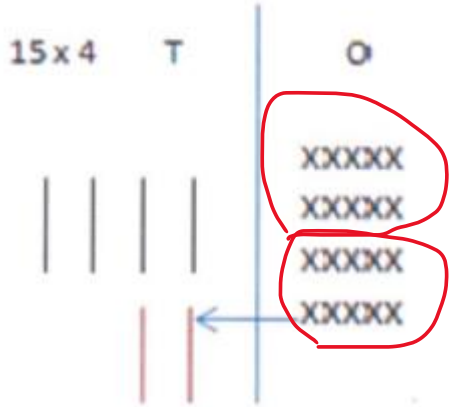
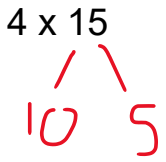
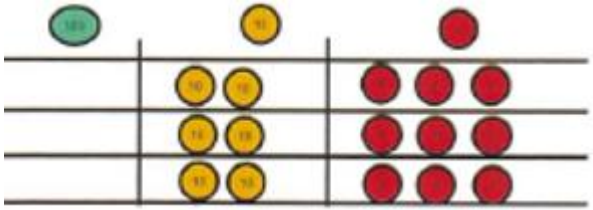
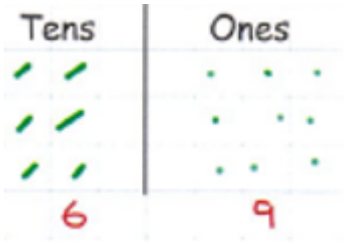
What's the calculation?
What's the answer?



Multiplication

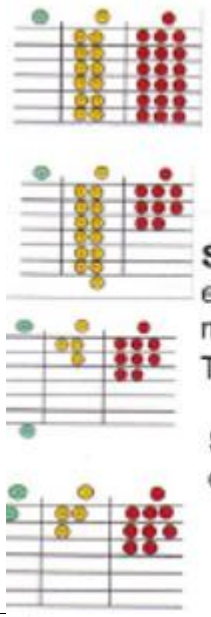
Key language that should be used: double, times, multiplied by, the product of, groups of, lots of, 'is equal to' 'is the same as'

Concrete	Pictorial	Abstract
Repeated grouping/ repeated addition (it does not have to be restricted to cubes) 3 x 4 or 3 lots of 4 or 3 groups of 4 	Children to represent the practical resources in a picture e.g. XX XX XX XX XX XX Use of Bar Model for a more structured method. 	3 x 4 = 4 + 4 + 4 =
Use number lines to show repeated groups 3 x 4 	Represent this pictorially alongside a number line. e.g. 	Abstract Number Line 3 x 4 = 12 
Use Arrays to illustrate commutativity (counters and other objects can also be used) 2 x 5 = 5 x 2 	Children to draw the arrays.  2 x 5 = 10  5 x 2 = 10	Children to be able to use an array to write a range of calculations.  2 x 5 = 10 5 x 2 = 10 5 + 5 = 1- 2+2 +2 +2 + 2 = 10

Partition to multiply (use Numicon, Base 10, Cuisenaire rods, unifix etc.) 	Children to represent the concrete manipulatives in a picture. e.g. Base 10 can look like this.  6 lots of 10 = 60 15x 4 = 60	Children to be encouraged to show the steps they have taken.  10 x 4 = 40 5 x 4 = 20 40 +20 = 60 A number line can also be used.
Formal column method with place value counters or base 10 (at the first stage- no exchange) You need to make 23 three times. See how many ones and how many tens.  60 + 9	Children to represent the counters in a pictorial way.  	Children record what it is they are doing to show understanding.  3 x 20 = 60 3x3 = 9 60+9 = 69

Formal column method with place value counters (children need this stage, initially, to understand how the column method works.

6 x 23=



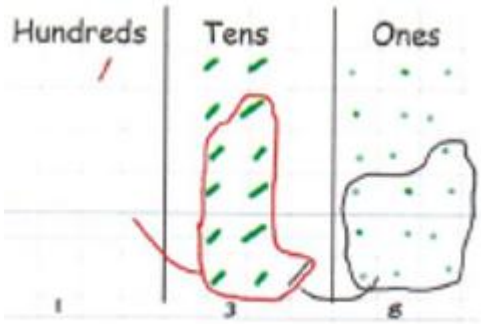
Step 1: get 6 lots of 23

Step 2: 6 x 3 is 18. Can I make an exchange? Yes! Ten ones for one ten....

Step 3: 6 x 2 tens and my extra ten is 13 tens. Can I make an exchange? Yes! Ten tens for one hundred...

Step 4- what do I have I each column?

Children need to represent the counters/ Base 10 pictorially e.g. the image below.



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

6 x 23 = 138

x	6
20	120
3	18

120
18 +
138

More examples:

17 x 3 = 51

x	3
10	30
7	21

30
21 +
51

28 x 14 = 392

x	20	8
10	200	80
4	80	32

200
80
80 +
32
1
392

When secure using the Grid Method to Mulitply the chidlren will be shown Short Multiplication. This is to prepare them to move to Parkfields and has been requested that we teach.

Formal Short Multiplication (2-digit × 1-digit)

Example: 24 × 3

```
  2 4
X   3
-----
    2
-----
  1
```

Step 1: Multiply the ones.

- 4 × 3 = 12.
- Write the 2 in the ones column.
- Exchange 10 ones for 1 ten and write the 1 underneath the line in the tens column.

Step 2: Multiply the tens.

- 2 tens × 3 = 6 tens.
- Add the exchanged 1 ten.
- 6 tens + 1 ten = 7 tens.

```
  2 4
X   3
-----
  7 2
-----
  1
```

Answer: 72

Example 246 × 5

Step 1: Multiply the ones

- 6 × 5 = 30
- Write 0 in the ones column.
- Exchange 3 tens and record the 3 underneath the line in the tens column.

```
  2 4 6
X     5
-------
    0
-------
  3
```

Step 2: Multiply the tens

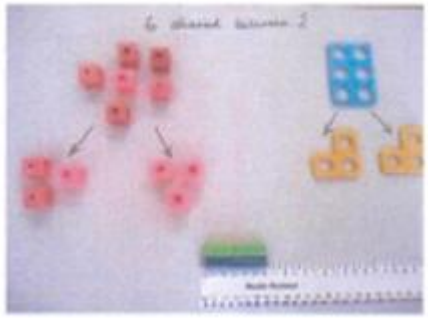
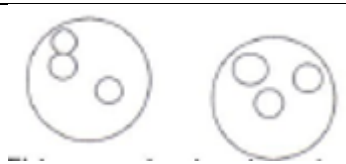
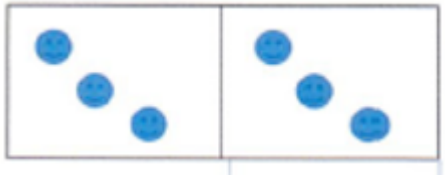
- 4 × 5 = 20
- Add the exchanged 3 tens: 20 + 3 = 23
- Write 3 in the tens column.
- Exchange 2 hundreds and record the 2 underneath the line in the hundreds column.

```
  2 4 6
X     5
-------
  2 3 0
-------
  2 3
```

	Step 3: Multiply the hundreds • 2 × 5 = 10 • Add the exchanged 2 hundreds: 10 + 2 = 12 • Write 12 in the remaining columns. 2 4 6 X 5 1 2 3 0 1 2 3 Answer: 246 × 5 = 1230

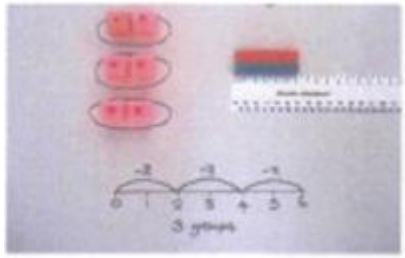
Division

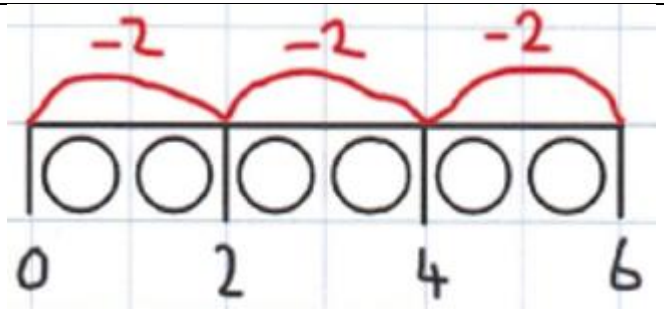
Key language that should be used: share, group, divide, divided by, half, 'is equal to' 'is the same as'

Concrete	Pictorial	Abstract
6 shared between 2 (other concrete objects can also be used e.g. children and hoops, teddy bears, cakes and plates. 	 This can be done in a bar so all 4 operations have a similar structure.  6 3 3	$6 \div 2 = 3$

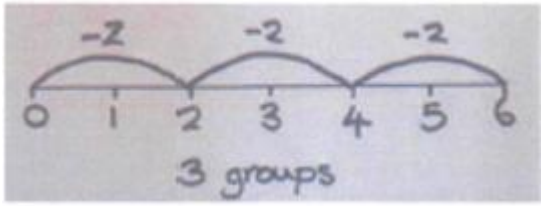
Understand division as repeated grouping and subtracting.

6 ÷ 2 = 3





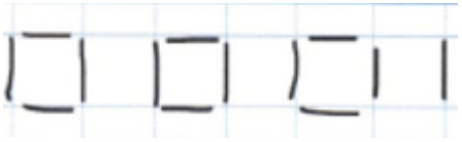
Abstract number line

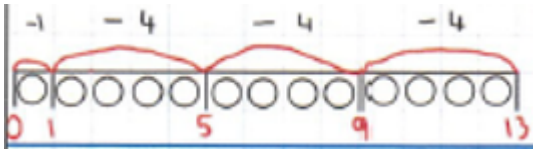


Division using remainders

13 divided by 4 = 3 r1

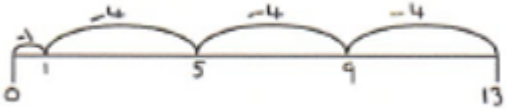
Children to have a chance to represent the resources they use in a pictorial way e.g. see below:





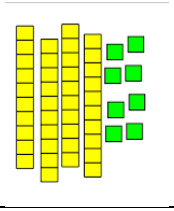
13 divided by 4 = 3r1

Children to count using their times tables facts in their heads.



Sharing using Base 10 (no remainders to start with)

48 ÷ 4= 12

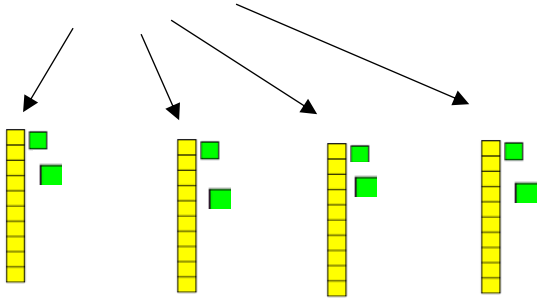


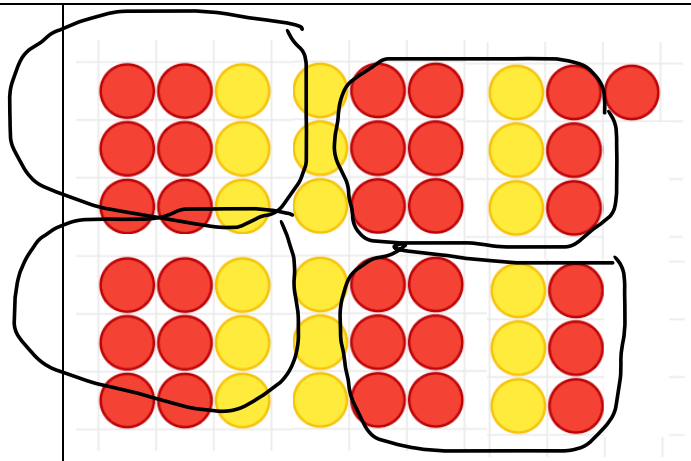
This can also be represented pictorially, till the children no longer need to do it.
It can also be done as decimal places if you have remainders.

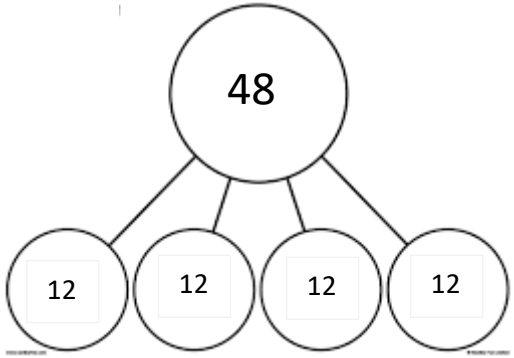
49 ÷ 4 = 12r1

48 ÷ 4= 12

48			
12	12	12	12



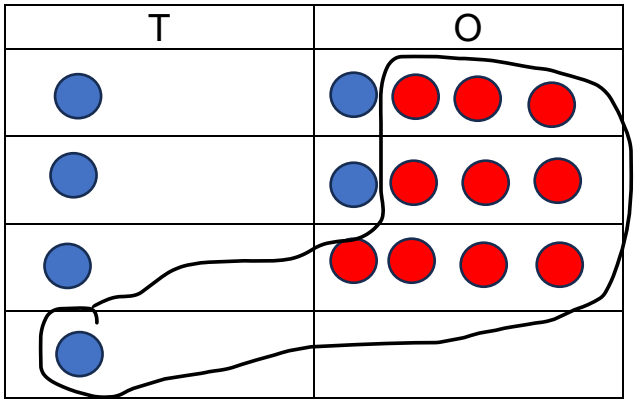


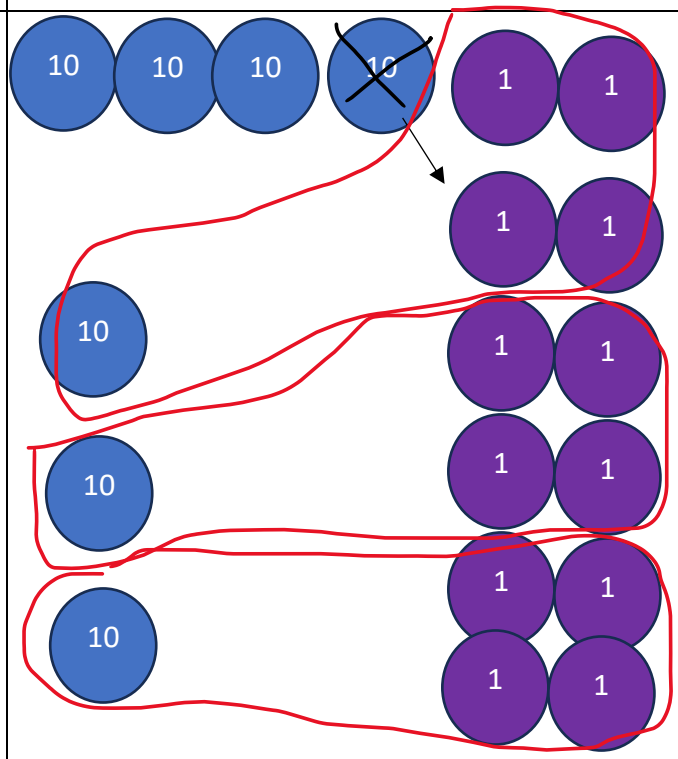


Sharing using place value counters.

42 ÷ 3 = 14

1. Make the 42
2. Exchange the 4th ten and turn into 10 ones.
3. Share the 10 ones into the three groups.





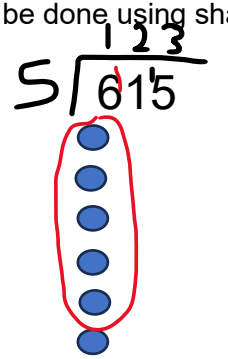
Children think about what they know. They might partition the numbers.

42 ÷ 3 = 14

42 =30 + 12

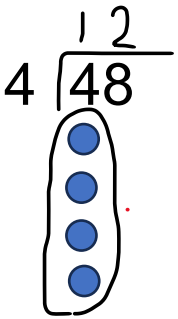
30 ÷ 3 = 10
12 ÷ 3 = 4
10 + 4 = 14

Use of the Bus Stop Method using grouping and counters. Key language for grouping 'How many groups of X can we make with X'
This can be done using sharing.



They children can be represented pictorially until the children no longer need it.

48 ÷ 4 =

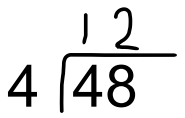


How many 4s in 4?

How many 4s in 8?

You can even use counters to show this.

48 ÷ 4 =

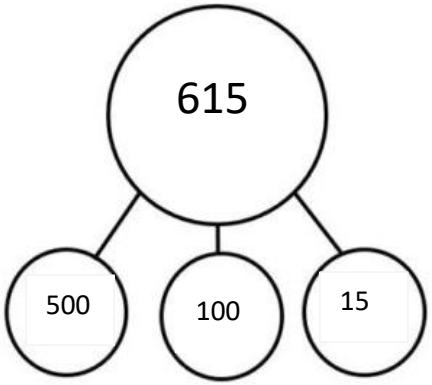


How many 4s in 4?

How many 4s in 8?

Fluency variation, different ways to ask children to solve 615 ÷5:

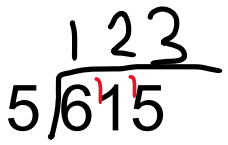
Use the Whole Model below. How can you divide 615 by 5 without using the Bust Stop Method.



How many 5s in 500? 100
How many 5s in 100? 20
How many 5s in 15? 3

I have £615 and share it equally between 5 bank accounts. How much will be in each bank?

615 pupils need to be put into 5 groups. How many will be in each group?



1. How many 5s in 6? 1
2. Carry the remaining 100 in front of the 1 ten.
3. How many 5s in 11? 2
4. Carry the remaining 10 over to the 5.
5. How many 5s in 15? 3

615 ÷ 5 =

☐ = 615÷ 5

What is the calculation?

615 ÷ 5 =

How could we solve this?

Partition the number

600 and 10 and 5

If there are 12 lots of 5 in 60 there must be 120 lots of 5 in 600.

There are 2 lots of 5 in 10.

There is 1 lot of 5 in 5.

Add up 100+20+3 = 123		How many 5s in 615?	If you add up the answers… 120 + 2 + 1 = 123