# Written Calculations Policy – Year 2

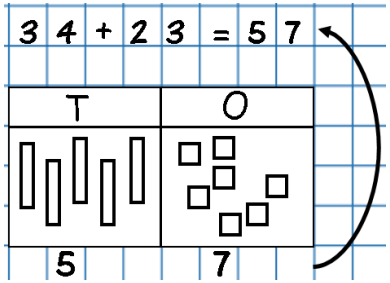
## Addition +

### Partitioning (Aggregation model)

Pupils create the two sets with concrete resources (e.g. Dienes) and then combine; adding the ones with ones first, before adding tens with tens in preparation for regrouping and columnar addition in later schooling.

34 + 23 = 57

Base 10 equipment:

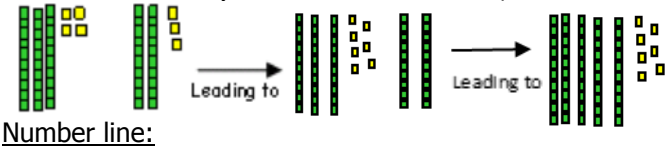




Pupils must not write 50 below the tens as 50 lots of 10 is equal to 500! A secure understanding of tens and ones is essential for this method.

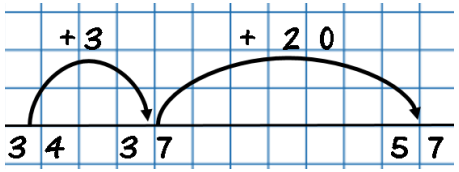
### Partitioning (Augmentation model)

Base 10 equipment:

Encourage the pupils to begin counting from the first set of ones and tens, avoiding counting from 1 (i.e. 30, 4 – 34). Beginning with the ones in preparation for formal columnar method (i.e. add the 3 ones first, not the 2 tens).



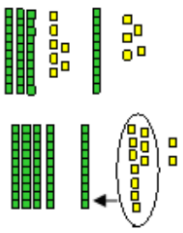

Number line:

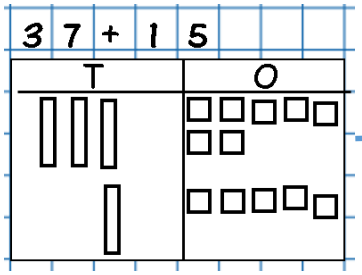


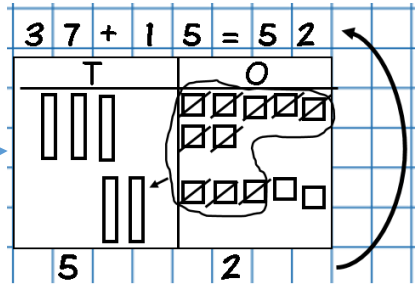

### Exchanging

Once secure in partitioning for addition, pupils begin to explore exchanging. What happens if the ones are greater than 10? Introduce the term 'exchange'. Using the concrete resources (e.g. Base 10, Dienes), pupils exchange ten ones for a single tens rod, before recording their work.

37 + 15 = 52





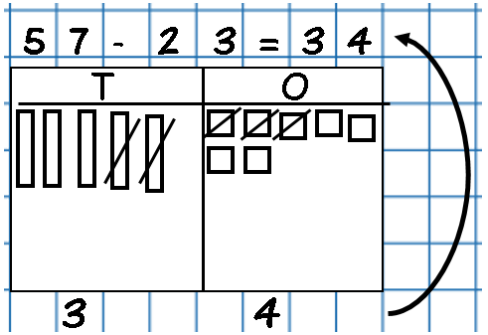

## Subtraction –

### Take away (Separation model)

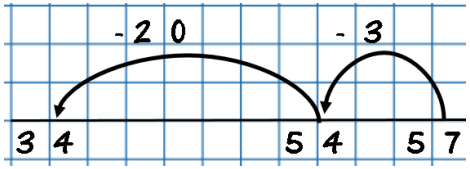
Pupils remove the lower quantity from the larger set, starting with the ones and then the tens. In preparation for formal decomposition.

57 – 23 = 34

Base 10 equipment:


Number Line:

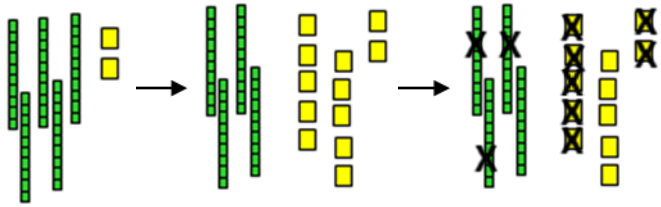



### Regrouping (Decomposition Method)

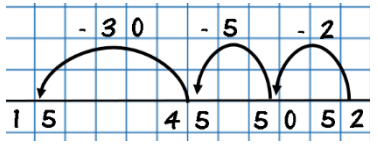
With a secure understanding of tens and ones, pupils can begin to explore how we find the difference when the ones digit in the subtrahend (number being taken away) is greater than the ones digit in the minuend (number we are subtracting from).

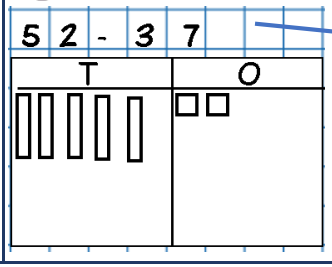
Base 10 equipment:

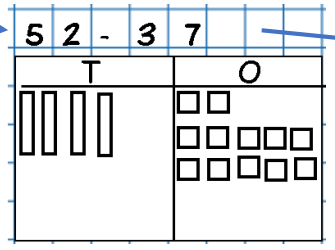
52 – 37 = 15

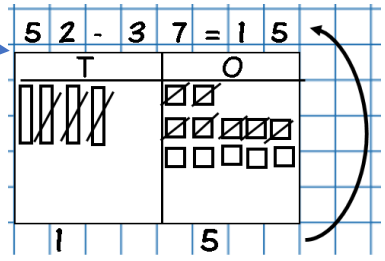


Number Line:



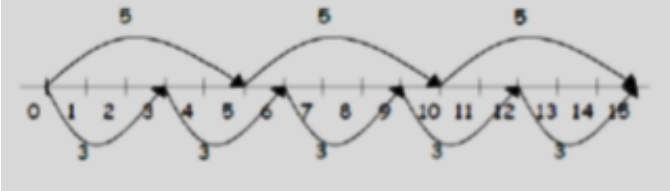



## Multiplication ×

**Commutativity**

Pupils learn that 3 x 5 has the same total as 5 x 3 – Commutative Law (for + and ×)
This can also be shown on a number line.
3 x 5 = 15
5 x 3 = 15

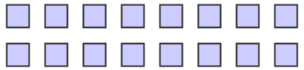



**Arrays**

Pupils learn to model a multiplication calculation using an array. This model supports their understanding of **commutativity** and supports the finding of factors of a number.

5 x 3 = 15

3 x 5 = 15

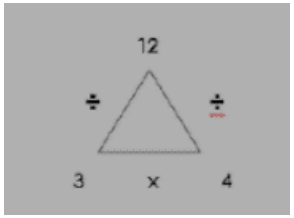


8 x 2 = 16

2 x 8 = 16

**Inverse operations**

Trios can be used to model the 4 related multiplication and division facts. Pupils learn to state the 4 related facts.
3 x 4 = 12
4 x 3 = 12
12 ÷ 3 = 4
12 ÷ 4 = 3

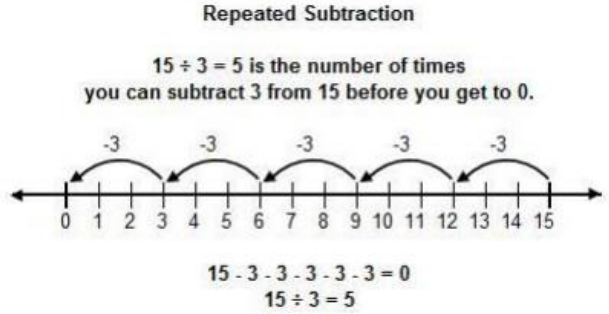



Pupils use symbols to represent unknown numbers and complete equations using inverse operations. They use this strategy to calculate the missing numbers in calculations.
▪ x 5 = 20  3 x Δ = 18  2 x ▪ = 20
24 ÷ 2 = ▪  15 ÷ O = 3  Δ ÷ 10 = 8

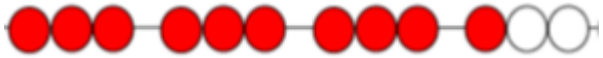
## Division ÷

**Repeated subtraction using a bead string or number line**

15 ÷ 3 = 5




The bead string helps pupils with interpreting division calculations, recognising for example that 12 ÷ 3 can be seen as 'How many 3s make 12?'



**Grouping involving remainders**

To further deepen pupils' understanding, consider calculations involving remainders.
13 ÷ 4 = 3 r1


Or using a bead string [see above].

**Arrays**

Pupils learn to model a division calculation using an array. This model supports their understanding of the development of partitioning and the short division method. This model also connects division to **finding fractions** of discrete quantities.

15 ÷ 3 = 5

15 ÷ 5 = 3