St. James' Church of England Nursery and Infant School

Calculation Policy

September 2023

Introduction

Children are introduced to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas, they develop ways of recording to support their thinking and calculation methods. They use particular methods and learn to interpret and use the signs and symbols involved. Alongside this is the acquisition of mathematical vocabulary enabling children to reason about numbers and apply their knowledge to solve problems.

Over time, children learn how to use models and images such as empty number lines to support their mental and informal written methods of calculation. As their mental methods are strengthened and refined, so too are their informal written methods. These methods become more efficient and succinct and lead to efficient written methods that can be used more generally.

At whatever stage in their learning, and whatever method is being used, it must still be underpinned by a secure and appropriate knowledge of **number facts**.

This policy has been created in order to provide a consistent approach to the teaching of calculation across the school.

The overall aim is that when children leave KS1 they:

- Have a secure knowledge of number facts and a good understanding of the four operations;
- Are able to use this knowledge and understanding to carry out calculations mentally and to apply general strategies when using one-digit and two-digit numbers. to special cases involving bigger numbers;
- Make use of diagrams and informal notes to help record steps and part answers when using mental methods
- Have a good range of mathematical vocabulary.
- Are able to use mathematical vocabulary to show their reasoning.

*The methods outlined for each year group in this policy are intended to be worked towards during the year. However, children **should not** move on to the next method until they are secure with methods from previous years.*

Addition

Addition

ADDITION SKILLS TO BE TAUGHT BEFORE TEACHING WRITTEN METHODS:

- To use vocabulary and symbols for addition *(e.g. +, more, plus, add, total, all together)*
- To understand addition as combining amounts to end up with a greater total
- When counting objects, know that the last number said is how many there are altogether
- To count on when counting how many objects there are, progressing to counting on from largest number
- To know that numbers can be added up in any order and the total will be the same
- To understand the place values of digits
- To compare numbers and use comparative vocabulary (e.g. greatest/smallest)
- To add 1, 10 and 100 confidently to any number using a number line or 100 square, progressing to calculating this mentally
- To be familiar with number lines and 100 squares and how they work

Year	Method
FS	Combining sets of objects (single digit numbers) Counting on from largest number using objects (start to use number line of objects)
Y1	Using a prepared number line (including bead strings or similar to reinforce bridging through ten) Using a 100 square to reinforce adding tens and ones
Y2	Using an “empty” number line to add, starting with the larger number - in jumps of tens and ones - in jumps of tens and all ones - tens in one jump then ones in one jump - bridging through ten where appropriate Partitioning tens and ones Column addition for TO + TO without carrying, progress to with carrying.

Addition - EYFS

Combining sets of objects (FS)

Learning Challenge: Can you add objects together?

Steps to Success:

1. I can count one set of objects
2. I can count a second set of objects
3. I can count all of the objects together

Counting on from largest number using objects (FS)

Learning Challenge: Can you add amounts together?

Steps to Success:

1. I can read the number sentence
2. I can recognise the largest number
3. I can choose the right amount of objects for the smallest number
4. I can put the biggest number in my head
5. I can count on using the objects to help
6. I can write the answer in the number sentence

Addition – KS1

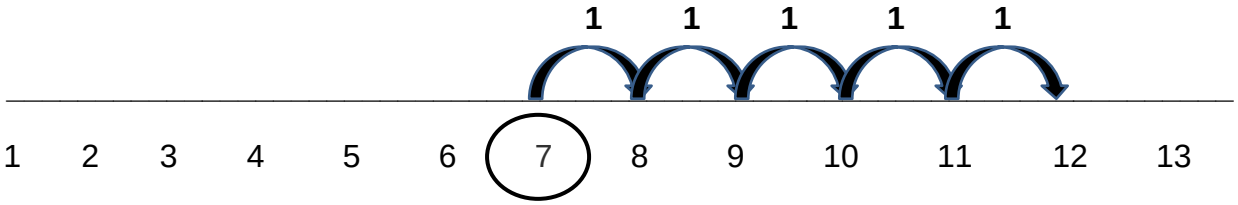
Using a prepared number line (F2 / Y1)

Learning Challenge: Can you add 1 and 2 digit numbers together?

Steps to Success:

1. I can read the number sentence
2. I can recognise (circle) the biggest number in the number sentence
3. I can find the biggest number on the number line
4. I can say how many ones I need to add
5. I can jump on the correct amount of ones on a number line
6. I can say which number I land on and know that this is the answer
7. I can check that my answer is reasonable and bigger than the number I started with
8. I can write the answer in the number sentence

e.g. 5 + (7) = 12



Using a 100 square (Y1 Spring / Summer Term and Y2)

Learning Challenge: Can you add 1 and 2 digit numbers?

Steps to Success:

1. I can circle the biggest number in the number sentence
2. I can partition the smaller number
3. I can add on the tens by going downwards
4. I can add on the ones by going left to right
5. I can circle and say which number I land on and know that this is the answer
6. I can check that my answer is reasonable and bigger than the number I started with
7. I can write the answer in the number sentence

e.g. 26 + 17 = 43

20 and 6

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
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Using an empty number line (Y2)

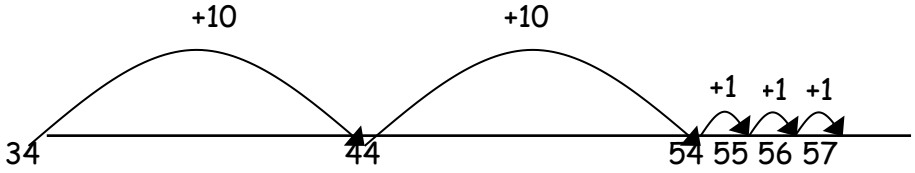
Learning Challenge: Can you add 2 digits to 2 digits?

Steps to Success:

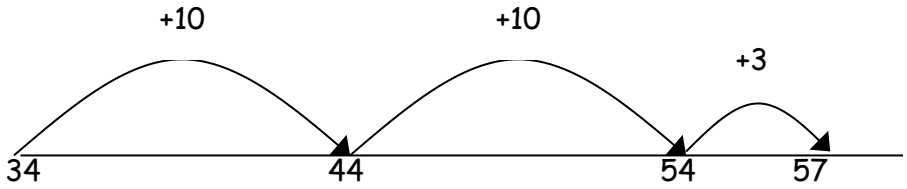
1. I can draw a straight line with a ruler
2. I can put the largest number on the **left hand side** of the number line
3. I can start on the **left hand side**
4. I can jump along the lines to the nearest 10
5. I can jump along in multiples of 10
6. I can write the size of the jump above the arrow
7. I can write the number I have jumped to below the arrow
8. I can compare my answer to my estimate to check my answer is reasonable

e.g. 34 + 23 = 57

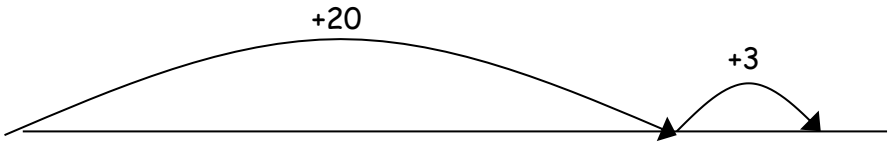
10 + 10 + 1+1+1; 10 + 10 +3; 20 + 3



First, children will count on in tens and then ones.



Then, encourage children to become more efficient by adding ones in one jump.



Followed by adding tens in one jump and then the ones.

The column written method without carrying (Y2)

When children have a secure understanding of tens and oness and are able to add 2 digits using a 100 square move on to the written method.

Learning Challenge: Can you use a written method for addition?

Steps to Success:

1. I can write the headings (T O) at the top of the columns
2. I can put the numbers from the question into the correct columns (one digit per box)
3. I can start adding from the ones on the **right hand side**
4. I can add the tens
5. I can check to see if the final answer is reasonable

```
  T  O
     64
+    22
    ---
     86
    ---
```

The column written method with carrying (Y2 Summer Term)

Learning Challenge:: To add together numbers with up to 3 digits

Steps to Success:

1. I can put the headings for each column at the top
2. I can put the numbers from the question into the correct columns (one digit per box)
3. I can put my addition sign next to the question
4. I can start adding from the ones on the **right hand side**
5. I can put the number which needs to be carried **under the answer line** of the next column
6. I can add the tens
7. I can check to see if there are any carried numbers to add
8. I can check to see if the final answer is reasonable

```
   625          783          367
+   48       +   42       +   85
   ---          ---          ---
```

673
1

825
1

452
1 1

SUBTRACTION

SUBTRACTION SKILLS TO BE TAUGHT BEFORE TEACHING WRITTEN METHODS:

- To use vocabulary and symbols for subtraction *(e.g. -, minus, take away, subtract, less)*
- To understand subtraction as “take away” where a number is reduced by another number and the answer is less than what was started with *(e.g. 5 take away 2 is 3).*
- To understand subtraction as “difference” where one number is bigger/smaller than another by the “difference” *(e.g. the difference between 5 and 2 is 3).*
- To understand the place value of digits
- To compare numbers and use comparative vocabulary (e.g. greatest/smallest)
- To subtract 1, 10 and 100 confidently from a number using a number line or 100 square, progressing to calculating this mentally
- To be familiar with number lines and 100 squares and how they work.

Year	Method
FS	Counting objects/structured apparatus
Y1	Using a prepared number line and practical apparatus
Y2	Using empty number lines Using a 100 square to reinforce subtracting tens and ones Progress to column subtraction for TO – TO without /with “borrowing”

Subtraction - EYFS

Using objects/structured apparatus (FS)

Learning Challenge: Can you take one set of objects away from a bigger group?

Steps to Success:

- I can read the number sentence
- I can circle the largest number
- I can choose the right number of objects for the smallest number
- I can take away the same number of objects as the smallest number
- I can count up the number of objects left and know that this is the answer
- I can check the answer is smaller than the number I started with

Once confident with this method, the objects can be substituted with drawing dots and crossing out the number of dots that are being subtracted, e.g. 

Children requiring additional support with subtraction will benefit from this sequence of activities:

Backward Counting Songs/Stories from 10
Rote counting backwards from 10 without objects
Rote counting backwards from 20 without objects
Practically count back on fingers from 10
Practically counting backwards from 10 with objects
Practically counting backwards from 20 with objects
Practically make a pile of objects smaller by taking some away
Practically find one less than any group of objects to 5
Practically find one less than any group of objects to 10
Create number sentences orally, physically and recorded in writing. Supported by use of: fingers, human number lines, washing lines, number lines on classroom walls, interactive whiteboards, large number cards, number fans. **Children should subtract underneath the number line**

Subtraction – Year 1

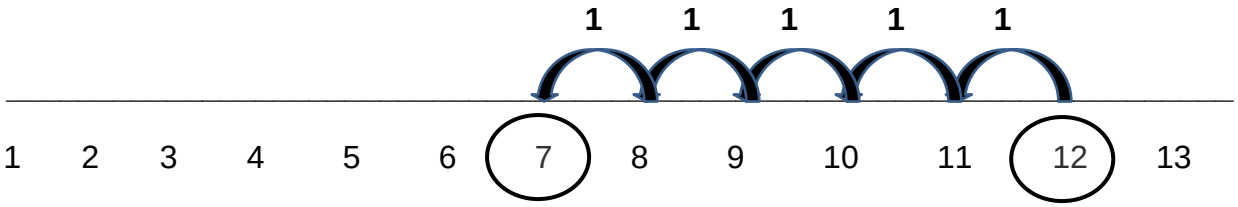
Using a prepared number line and practical apparatus (Y1)

Learning Challenge: Can you subtract a single digit from a 2 digit number?

Steps to Success:

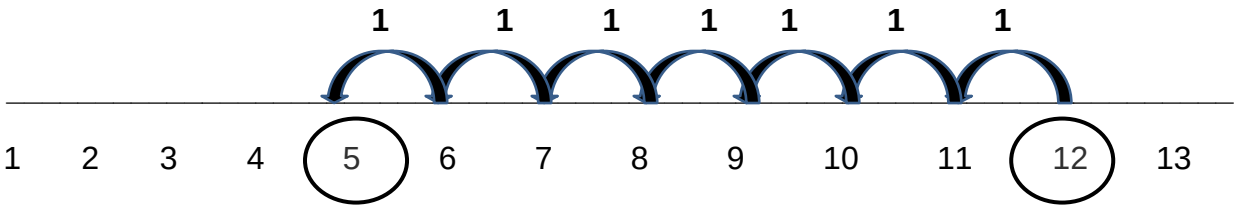
1. I can read the number sentence
2. I can circle the biggest number in the number sentence
3. I can find the biggest number on the number line
4. I can say how many ones I need to take away
5. I can jump back the same number of ones
6. I can say which number I land on and know that this is my answer
7. I can check to make sure my answer is smaller than the number I started with
8. I can write the answer in the number sentence

e.g. 12 - (5) = 7



The number line should also be used to show difference:

e.g. 12 - 5 also means the difference between



Using a 100 square (Y1/2)

Learning Challenge:: To subtract/ take one amount from another (TO and O up to 20)

Steps to Success:

1. I can read the number sentence
2. I can circle the biggest number
3. I can partition the smaller number
4. I can subtract the tens
5. I can subtract the ones
6. I can circle and say the number I land on and know that this is the answer
7. I can check to make sure my answer is reasonable and smaller than the number I started with
8. I can write the answer in the number sentence

e.g. 43 – 17 = 26

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
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Subtraction – Year 2

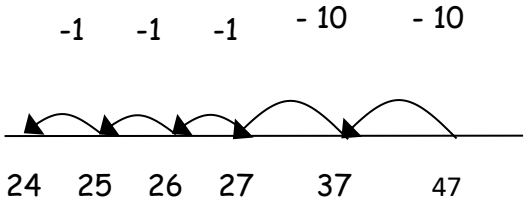
Using an empty number line to subtract (Y2)

Learning Challenge: Can you subtract 2 digits from 2 digits without a 100 square?

Steps to Success:

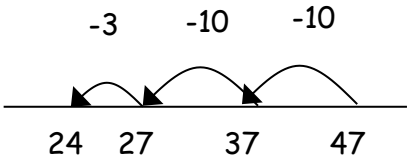
1. I can circle the largest number
2. I can partition the smaller number into chunks
3. I can draw a number line with a ruler
4. I can put the largest number on the **right hand side** of the line
5. I can start on the **right hand side**
6. I can jump back along the number line in tens and ones
7. I can write the number I have jumped to under the number line after making each jump
8. I can write the size of the jump above each arrow
9. I can check my answer to make sure it is reasonable

47 – 23 = 24



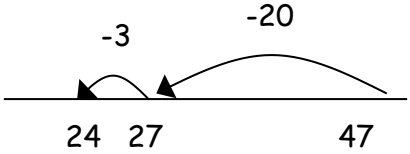
First, children will count back in tens and ones.

47 – 23 = 24



Then, encourage children to become more efficient by subtracting ones in one jump.

47 – 23 = 24



Followed by subtracting tens in one jump and then the ones.

*** Children need to understand that the same method is used to find the difference.**

Subtraction

The column written method without "borrowing" (Y2)

Learning Challenge: Can you use a written method for subtraction?

Steps to Success:

1. I can write the headings (T O) at the top of the columns
2. I can put the numbers from the question into the correct columns (one digit per box)
3. I can check that I have written the correct number at the top of the calculation
4. I can start by subtracting from the ones on the **right hand side**
5. I can check to see if the final answer is reasonable *(It may be helpful to use addition to check answers).*

```
  T  O
     64
-    22
     42
```

The column written method with "borrowing" (Y2 Summer Term)

Learning Challenge: Can you choose a written method for subtraction?

Steps to Success:

1. I can put the numbers from the question into the correct columns (one digit per box)
2. I can check to see if I will need to "borrow" *(look out for children swapping digits over)*
3. I can start by subtracting from the ones on the **right hand side**
4. If I need to "borrow" I can take from the next digit on the left by crossing it out and writing how many left above it
5. I can write the ten/hundred I have taken as a "1" in the correct column
6. I can check to see if the final answer is reasonable *(It may be helpful to use addition to check answers).*

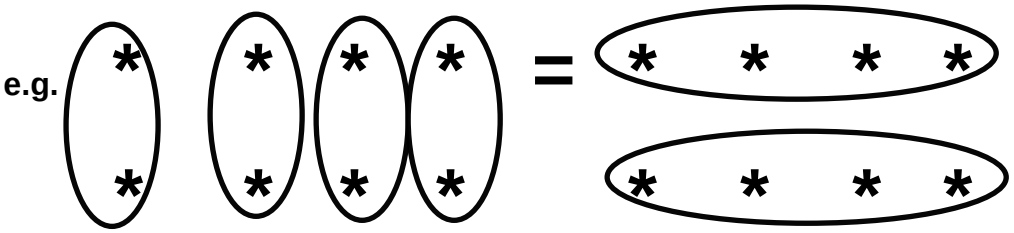
```
    6
    6 7 5
-     48
    -----
    6 2 7
```

e.g. 625 – 48 = 627

Multiplication

MULTIPLICATION SKILLS TO BE TAUGHT BEFORE TEACHING WRITTEN METHODS:

- To use vocabulary and symbols for multiplication *(e.g. x, lots, sets, piles, groups of)*
- To understand the place value of digits
- Recognise, from making arrays, that multiplication can be done in any order
- Use the x and = symbols to describe and record number sentences involving multiplication
- Use objects or structured apparatus to solve grouping problems
- Describe and array in different ways



4 x 2 = 2 x 4

- To be familiar with number lines and how they work
- To be able to recall multiplication facts by heart

Year	Method
FS/Y1	FS – Doubling Introduce to lots of / counting in 2/5/10 Use objects/structured apparatus
Y1	Use objects to write and calculate multiplication sentences With adult support, use objects to solve multiplication word problems
Y2	Make arrays to represent multiplication sentences Use repeated addition on a number line

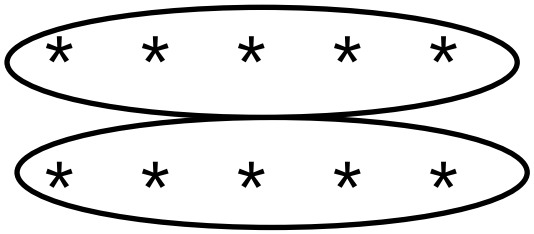
Using objects or visual representation (FS/Y1)

Learning Challenge: Can you find 'lots of' a number?

Steps to Success:

1. I can read a multiplication sentence using the words "lots of"

2. I can make a group of objects (array) or dots to match the sentence
3. I can count how many there are in total
4. I can check my answer is reasonable
5. I can write my answer in the multiplication sentence

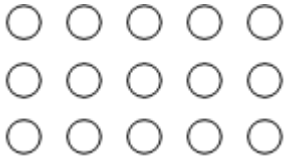


Make arrays to represent multiplication sentences (Y1 /)

Learning Challenge: Can you multiply a single digit by a single digit?

Steps to Success:

1. I can read a multiplication sentence
2. I can make an array to match the sentence
3. I can count how many there are in total
4. I can check my answer is reasonable
5. I can write my answer in the multiplication sentence
6. I can recognise the other multiplication fact that matches the array



5 x 3 = 15

3 x 5 = 15

Use repeated addition on a number line (Y2)

Learning Challenge: Can you use repeated addition to multiply?

(N.B. less able children may need a prepared number line initially).

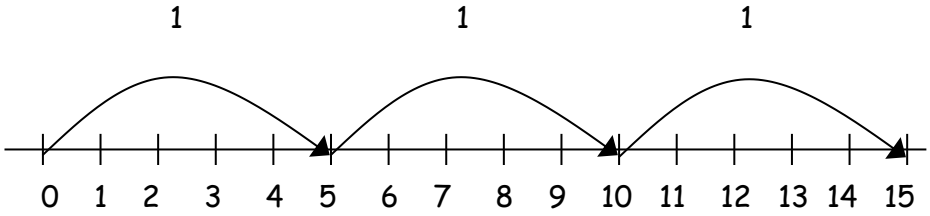
Steps to Success:

1. I can draw an empty number line
2. I can put my start number (0) on the **left hand side**
3. I can circle the number I am going to count on in (the number I am multiplying by) in the number sentence
4. I can count up in the number I am multiplying by, and write the number of jumps above the arrow

5. I can write the number I have jumped to below the number line
6. I can say which number I land on and know that this is my answer
7. I can check my answer to make sure it is reasonable

3 times 5 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x 3

$3 \times (5) = 15$



Division

DIVISION SKILLS TO BE TAUGHT BEFORE TEACHING WRITTEN METHODS:

- To use vocabulary and symbols for division (e.g. ÷, share, group*)*
- To understand the place values of digits
- To use counting to solve sharing problems (e.g. “Share 6 sweets between 3 children”)
- To use objects or structured apparatus to solve sharing/grouping problems
- To be familiar with number lines and how they work

Year	Method
FS/Y1	Use objects/structured apparatus to create groups/share equally Halving
Y1	Use objects to write and calculate division sentences Jottings With adult support, use objects to solve division word problems
Y2	Repeated subtraction/grouping on a number line

Division

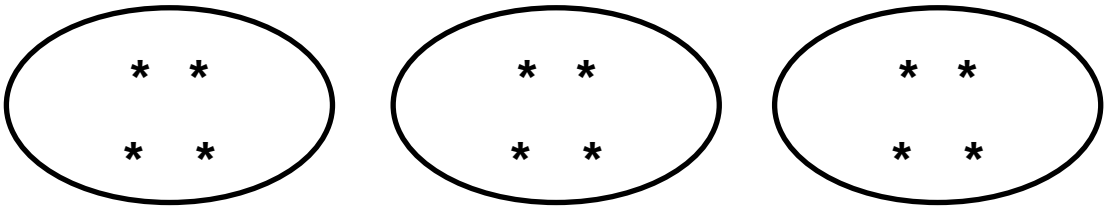
Use objects to create equal groups/share equally (FS/Y1)

Learning Challenge: Can you share objects equally?

Steps to Success:

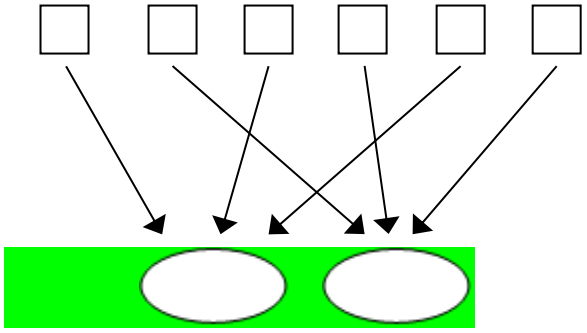
1. I can read the question
2. I can identify the second number and know this is how many I am sharing by
3. (FS) I can share/group objects equally
   (Y1) I can draw circles for the number I am sharing by
   (Y1) I can use dots/objects to help
4. I can count the number in each group/circle and know this is my answer
5. I can check to make sure my answer is reasonable

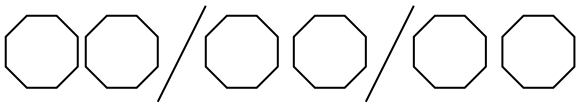
e.g. 12 ÷ 3 = 4



6 sweets shared between 2 people; how many do they get each?

There are 6 sweets, how many people can have 2 sweets each?





Sharing equally **Grouping or repeated subtraction**

Children will begin to learn about division through:
Number rhymes, songs and stories
Promotion of language – share, divide, group, split
Sharing out objects equally e.g. when they share ten stickers among five children how many stickers does each child get?
Practically with remainders e.g. Share out the milk at snack time. Have we got enough? Have we got any left over?

Division - Year 2

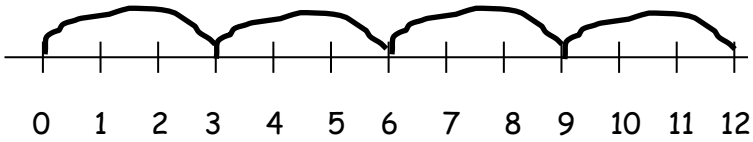
Use repeated subtraction/grouping on a number line (Y2)

Learning Challenge: Can you divide a 2 digit number by a single digit?

Steps to Success:

1. I can draw a number line
2. I can write zero on the **left hand side**
3. I can write the target number on the **right hand side**
4. I can circle the number I am dividing by
5. I can make each jump the size of the number circled
6. I can count the number of jumps I have made to reach the target number
7. I can check to make sure my answer is reasonable

e.g. 12 ÷ (3) = 4



Use a number line to calculate TO ÷ O including remainders (Y2)

Learning Challenge: Can you divide a 2 digit number by any single digit?

Steps to Success:

1. I can draw a number line
2. I can write zero on the **left hand side**
3. I can write the target number on the **right hand side**
4. I can circle the number I am dividing by
5. I can make each jump the size of the number circled
6. I can count the number of jumps I have made to reach the target number
7. I can recognise if there is a remainder
8. I can check to make sure my answer is reasonable

e.g. 13 ÷ (4) = 3 r 1

