

Addition

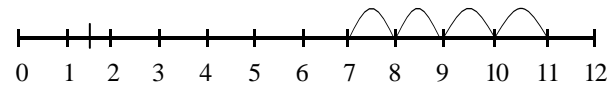
Foundation Stage:

- Practical activities involving addition.
- Songs and rhymes – how many do you know involving addition rather than counting back.
- Practical activities as above but beginning to use number lines as models to support understanding.

Y1

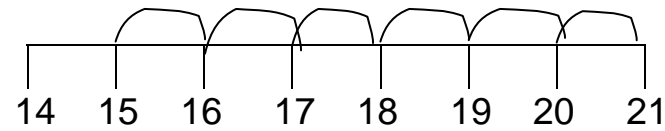
- Practical activities
- Supported with use of number line
- Introduction of number sentence and symbols

$$7 + 4$$



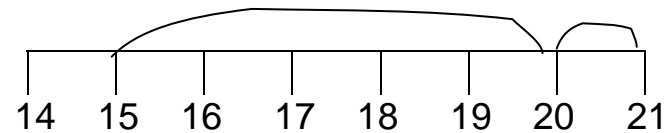
Recording by - drawing jumps on prepared lines

Y1/2



$$15 + 6 = 21$$

Moving towards more efficient method



$$15 + 6 = 21$$

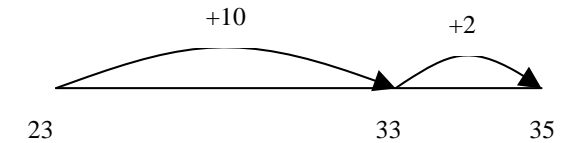
Y2

Partition into tens and ones and recombine

$$\begin{aligned} 12 + 23 &= 10 + 2 + 20 + 3 \\ &= 30 + 5 \\ &= 35 \end{aligned}$$

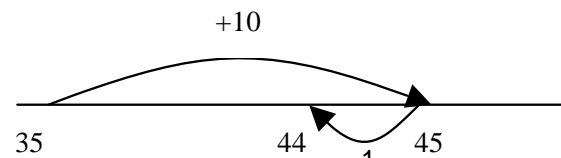
refine to partitioning the second number only:

$$\begin{aligned} 23 + 12 &= 23 + 10 + 2 \\ &= 33 + 2 \\ &= 35 \end{aligned}$$



Y2

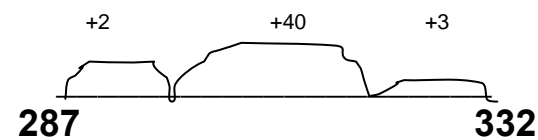
Add 9 or 11 by adding 10 and adjusting by 1
 $35 + 9 = 44$



Y3

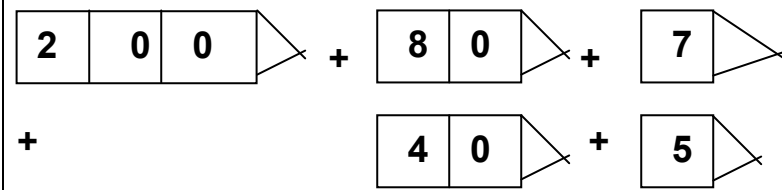
Addition through partitioning in a variety of contexts using different methods.

- Number lines;
Bridge to next multiple of 10
 $287 + 45$



Y3

- partitioning using place value arrow cards;



$$\begin{array}{r} 200 \\ + \\ 120 \\ + \\ 12 \\ \hline = 332 \end{array}$$

- vertical recording of partitioning;

$$\begin{array}{r} 200 \\ 120 \text{ (80 + 40)} \\ +12 \text{ (7 + 5)} \\ \hline 332 \end{array}$$

Y3

- partitioning HTU;

$$200 + 80 + 7 + 40 + 5 =$$

$$12 + 120 + 200 = 332$$

Y3-4

$$234 + 328$$

$$200 + 30 + 4$$

$$300 + 20 + 8$$

$$500 + 50 + 12 = 562$$

Y4-Y6

$$287 + 56$$

$$56.7 + 72.3$$

$$\begin{array}{r} 287 \\ 56 \\ \hline \end{array}$$

$$13$$

$$130$$

$$200$$

$$343$$

$$\begin{array}{r} 56.7 \\ 72.3 \\ \hline \end{array}$$

$$1.0$$

$$8.0$$

$$120.0$$

$$129.0$$

Y5- Y6

Move towards formal compact method.

$$\begin{array}{r} 287 \\ 45 \\ \hline \end{array}$$

$$332$$

$$332$$

$$\uparrow \uparrow$$

Y6

Extend to numbers with any number of digits and decimals with 1 and 2 decimal places.

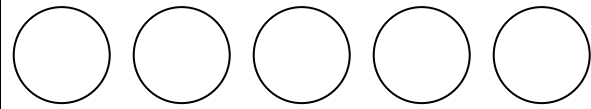
$$124.9 + 117.25 = 242.15$$

$$\begin{array}{r} 124.9 \\ + 117.25 \\ \hline 242.15 \\ \hline \end{array}$$

Subtraction

Foundation Stage:

- Number rhymes and songs / with actions. Use of practical resources to illustrate the song
E.g. 5 currant buns in the bakers shop And took it right away



Mark the place of the subtracted object, eg leave a plate for each bun. Also take the opportunity to link to the inverse operation;

4 buns on the plates and one in the bag

- Use washing lines / number carpet tiles ~ precursors to number lines

Y3/4

Choose appropriate operations / methods to solve calculation problems

There are 93 girls in Y4 and 76 boys. How many more girls than boys?

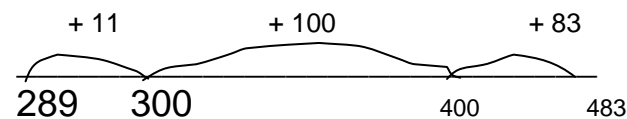
- use counting on to find the difference



Y4/6

3 digit calculations: 483 - 289

- number line model



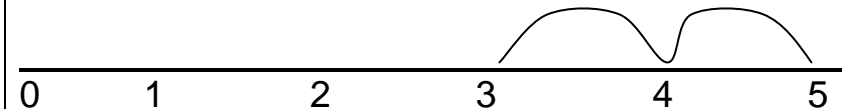
The partitioned chunks are then either added mentally or using the column method.

Y1/2

- Pictorial representation
- Linked to number line underneath

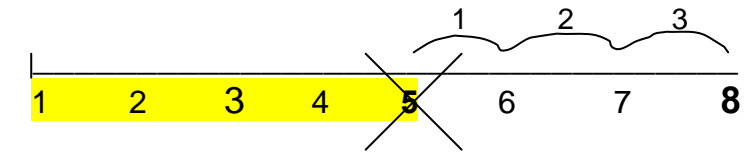
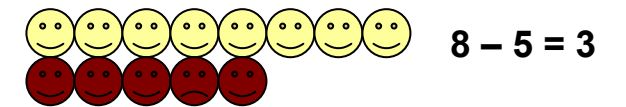


$$5 - 2 = 3$$



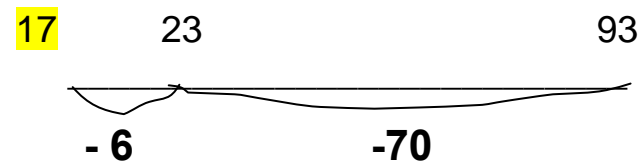
Y1/2

- Finding the difference or How many more!
Pictorially:



- partitioning

$$(93 - 70) - 6 = 23 - 6 = 17$$



- Counting on should be done above the number line, partitioning and counting back should be done underneath.

Y3/4

use understanding of inverse operations / commutative law to solve problems

$$90 - \square = 37$$

$$90 - 37 = \square$$

or

$$37 + \square = 90$$

Using counting on

Y6

This method is only to be used if children are completely secure in the previous methods.

| | | | | |
|---|----------------|-----------------|----------|--|
| | (use 100) | | (use 10) | |
| | 300 | 170 | 10 + | |
| | 400 | + 80 | + 3 | |
| - | 200 | + 80 | + 9 | |
| | 100 | + 90 | + 4 | |

At all stages children should be encouraged to:

- approximate answers
- choose most efficient method they can use with understanding
- check answer using inverse operation / alternative method / calculator

The number line should be used both vertically and horizontally to get children used to a variety of scales and models.

Multiplication

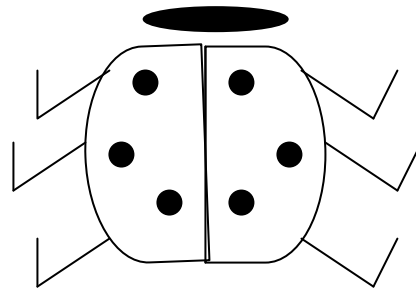
Foundation Stage:

Step1

- Through role play/general play situations find pairs of. e.g. How many socks will we need for the three bears? How many buckets and spades will we need for every one to have one each in the sand?.
 - Sorting objects into groups e.g. We have got 4 biscuits how can we share them out equally (fairly) between the two of us?
 - Playing pairs game i.e snap, pelmanism.
- Recognising the doubles in dominoes and dice games (using the language you have a pair/you have a double)

F2/ Y1

- Counting in 2's and 10's.
- Identifying doubles via dice games and using dominoes.
- Practical illustrations of **finding half of numbers** not just fractions of shapes.



Y2

- Counting in 2's, 5's and 10's on and back starting at zero then counting from other numbers.
- Know halves and doubles of numbers to 10
- Repeated addition with small numbers, illustrated by practical examples.

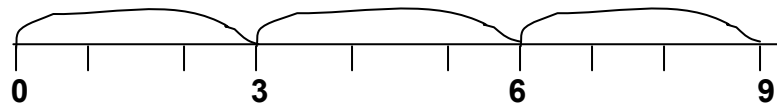
$$2+2+2=$$



Y2

Repeated addition on number lines

$$3+3+3=$$



$$3 \times 3 = 9$$

- Repeated addition **showing links** to multiplication statements
- **Learn** multiplication facts for the 2's and 10's x tables and **be able to use** the 5's.

Y3

- To **learn** multiplication facts for the 3,4, and 6 x tables.
 - Be able to calculate single digit x multiple of 10 e.g. 3x4
 - Once the children understand these concepts and are confident in their knowledge of the multiplication facts they are ready to progress towards standard methods of recording.
- Before the children progress through the next steps they should:
- Be reasonably comfortable multiplying single digit numbers by single digit numbers (they might not have instant recall of all multiplication facts but should be able to derive most facts reasonably quickly).
 - Be able to use single digit multiplication facts e.g. 3x4 to calculate single digit x multiple of 10 e.g. 30x4 and partition numbers into tens and units.

Y3-5

- Partitioning - using distributive law

Model A

$$\begin{aligned} \text{eg. } 12 \times 4 &\rightarrow (10 \times 4) + (2 \times 4) \\ &= 40 + 8 \\ &= 48 \end{aligned}$$

$$\begin{aligned} \text{eg. } 43 \times 5 &\rightarrow 200 + 15 \\ &= 215 \end{aligned}$$

Y3-5

- Grid method: It uses the same concept of partitioning but provides children with a scaffold for their learning and management of numbers in a different layout.

Model B

Eg. $17 \times 3 = 51$

| | | |
|---|----|----|
| x | 10 | 7 |
| 3 | 30 | 21 |

- Extend to numbers where answer bridges 100

$$38 \times 6 = 228$$

| | | |
|---|-----|----|
| x | 30 | 8 |
| 6 | 180 | 48 |

Y5

- Extend to two digit by a multiple of 10

$$42 \times 30 = 1260$$

| | | |
|----|------|----|
| x | 40 | 2 |
| 30 | 1200 | 60 |

- Extend to 2 digit by 2 digit

$$34 \times 27$$

| | | |
|----|-----|----|
| x | 30 | 4 |
| 20 | 600 | 80 |
| 7 | 210 | 28 |

$$600 + 210 + 80 + 28 = 918$$

Children to use column method for addition if necessary. This can be extended to incorporate three digit numbers when necessary.

Division

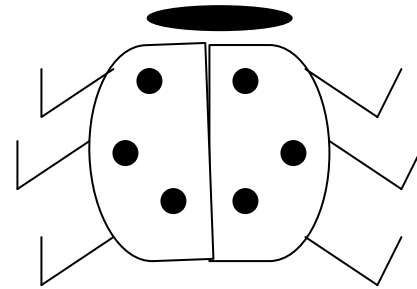
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F2/ Y1

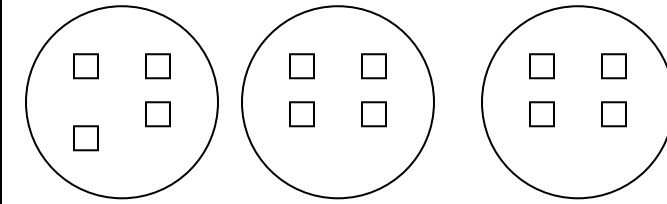
- Counting in 2's and 10's.
- Identifying halves via dice games and using dominoes.
- Practical illustrations of **finding half of numbers** not just fractions of shapes.



Y2/3

They should have experience of sharing

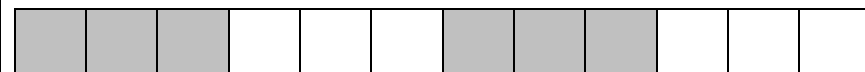
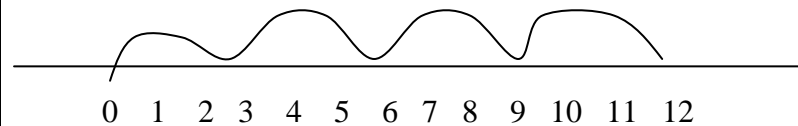
$$12 \div 3 = \square \square \square \square \square \square \square \square \square \square \square \square$$



- and of grouping (repeated subtraction)

Y2/3

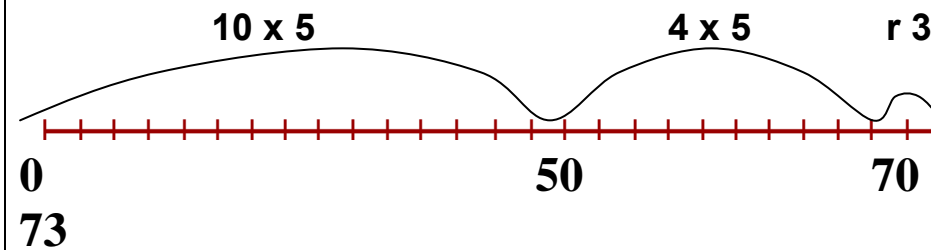
$$12 \div 3 = \text{how many 3's make 12?}$$



Y4/5

The model used previously is continued in Y4 and Y5 but grouping 'chunks' together. E.g.

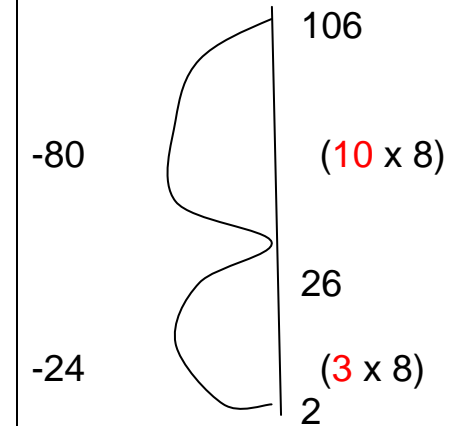
$$73 \div 5$$



$$73 \div 5 = 14 \text{ groups altogether with 3 remaining.}$$

This method can be continued in a vertical format.

$$106 \div 8$$



$$106 \div 8 = 13 \text{ r } 2.$$

Y5/6

When children are secure in the method of using a number line to subtract chunks of numbers they can then move onto using formal chunking method.

$$\begin{array}{r} 5 \sqrt{73} \\ - 50 \quad (10 \times 5) \\ \hline 23 \\ \underline{20} \quad (4 \times 5) \\ \hline 3 \end{array} \quad 10 + 4$$

$$73 \div 5 = 14 \text{ r } 3$$

Y6

Extend to 3 digit numbers first subtracting 10x divisor

$$\begin{array}{r} 7 \sqrt{256} \\ - 70 \quad (10 \times 7) \\ \hline 186 \\ \underline{140} \quad (20 \times 7) \\ \hline 46 \\ \underline{42} \quad (6 \times 7) \\ \hline 4 \end{array} \quad 10 + 20 + 6$$

$$256 \div 7 = 36 \text{ r } 4$$

Y6

- Extend to 3 digit divided by 2 digit

$$\begin{array}{r} 36 \sqrt{972} \\ - 720 \quad (20 \times 36) \\ \hline 252 \\ \underline{180} \quad (5 \times 36) \\ \hline 72 \\ \underline{72} \quad (2 \times 36) \\ \hline 0 \end{array} \quad 20 + 5 + 2$$

$$972 \div 36 = 27$$