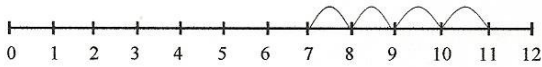


A D D I T I O N

Stage 1 -

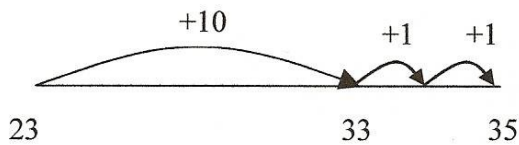
Using number lines to count on ones.

$$7 + 4 = 11$$



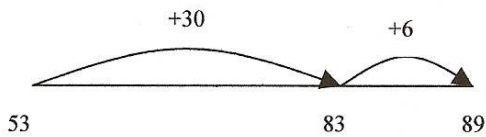
Stage 2 -

$$\begin{aligned} 23 + 12 &= 23 + 10 + 1 + 1 \\ &= 33 + 1 + 1 \\ &= 35 \end{aligned}$$



Stage 3 -

Partition into tens and ones and recombine.



Stage 4 -

$$83 + 42 = 125$$

$$\begin{array}{r} 80 + 3 \\ + 40 + 2 \\ \hline 120 + 5 = 125 \end{array}$$

Progress to:

$$\begin{array}{r} 83 \\ +42 \\ \hline 5 \\ \hline 120 \\ \hline 125 \end{array}$$



Stage 5 -

Formal method, showing numbers carried underneath.

$$\begin{array}{r} 358 \\ + 73 \\ \hline 431 \\ 11 \end{array}$$

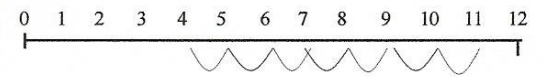
Extend to numbers with any number of digits and decimals with 1 and 2 decimal places.

S U B T R A C T I O N

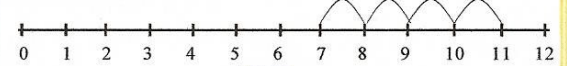
Stage 1 -

Using number lines to count back in ones.

$$11 - 7 = 4$$



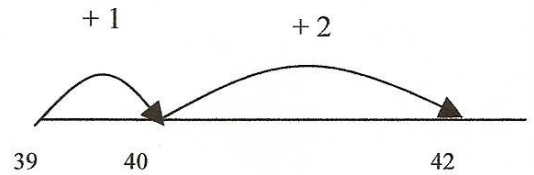
Counting on, using a number line, to find the difference between 7 and 11.



Stage 2 -

Find a small difference by counting up.

$$42 - 39 = 3$$

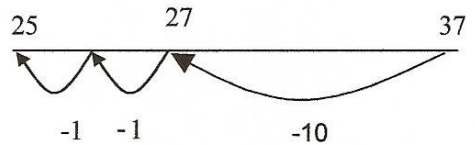


Stage 3 - Counting back in tens and ones.

$$37 - 12 = 37 - 10 - 1 - 1$$

$$= 27 - 1 - 1$$

$$= 25$$



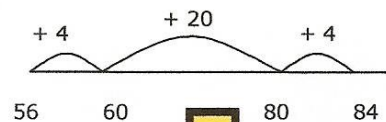
Progressing to taking larger jumps with the units.



Stage 4 -

Complementary addition (counting up from the smaller number to the larger number)

$$84 - 56 = 28$$



Stage 5 -

Decomposition

$$\begin{array}{r} \overset{8}{\cancel{8}}2 \\ - 38 \\ \hline 54 \end{array}$$

$$\begin{array}{r} \overset{2}{\cancel{8}}\overset{4}{\cancel{8}}2 \\ - 178 \\ \hline 174 \end{array}$$

Progress to using decomposition with decimals.

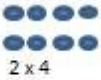
M U L T I P L I C A T I O N

Stage 1 -
Pictures and Symbols
 There are 3 sweets in one bag.
 How many sweets are there in 5 bags?




Stage 2 -
Arrays and repeated addition

4 x 2 or 4 + 4

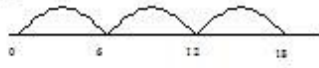


2 x 4

2 + 2 + 2 + 2



Stage 3 -
Number Lines
 E.g. 6 x 3



Partitioning
 E.g. 15 x 2 = 30

$$\begin{array}{r} X \quad 10 \quad 5 \\ 2 \quad 20 \quad 10 = 30 \end{array}$$

Stage 4 -
Grid method

E.g. 35 x 2 = 70

$$\begin{array}{r|l} X & 30 & 5 \\ 2 & 60 & 10 = 70 \end{array}$$

E.g. 123 x 3 = 369

$$\begin{array}{r|l} X & 100 & 20 & 3 \\ 3 & 300 & 60 & 9 = 369 \end{array}$$

Grid method
 E.g. 72 x 38 = 70

$$\begin{array}{r|l} X & 70 & 2 \\ 30 & 2100 & 60 = 2160 \\ 8 & 560 & 18 = + 578 \\ \hline & 2738 \end{array}$$

Progressing to using the grid method for decimals.

Stage 5 -
Short Multiplication : TU x U
 E.g. 23 x 7

$$\begin{array}{r} 23 \\ X \quad 7 \\ \hline 140 \quad 20 \times 7 \\ + \quad 21 \quad 3 \times 7 \\ \hline 161 \end{array}$$


Leading to

$$\begin{array}{r} 23 \\ X \quad 7 \\ \hline 161 \end{array}$$

Stage 6 -
Long Multiplication : TU x TU
 E.g. 72 x 38


$$\begin{array}{r} 72 \\ X \quad 38 \\ \hline 576 \quad 72 \times 8 \\ + 2160 \quad 72 \times 30 \\ \hline 2736 \end{array}$$

Stage 1 -
Pictures/ marks
 12 children get into teams of 4 to play a game. How many teams are there?




Stage 2 -

Sharing – 6 sweets are shared between 2 people. How many do they have each? (6 ÷ 2)



Grouping – There are 6 sweets. How many people can have 2 each? (How many 2's make 6?)




Stage 3 -
Division with remainders
 16 ÷ 3 = 5 r 1

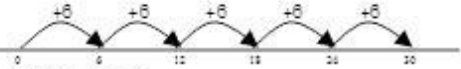
Sharing – 16 shared between 3, how many left over?

Grouping – How many 3's make 16, how many left over?

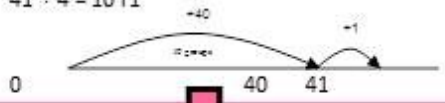
e.g.



Stage 4 -
 30 ÷ 6 can be modelled as:
 Grouping – counting on in 6's until you reach the number you are dividing. E.g.



41 ÷ 4 = 10 r 1



Stage 5 -
 Using chunking for division. Total all the 'chunks' of 8 to find the answer.

$$\begin{array}{r} 8 \overline{) 146} \\ - 80 \quad (8 \times 10) \\ \hline 66 \\ - 40 \quad (8 \times 5) \\ \hline 26 \\ - 24 \quad (8 \times 3) \\ \hline 2 \end{array}$$

Answer: 18 r 2

This method can also be used when dividing larger numbers and decimals, and when there is a remainder.

Stage 6 -
Long Division

$$\begin{array}{r} 72 \\ 7 \overline{) 504} \\ - 49 \quad | \\ \hline 14 \\ - 14 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 27 \\ 36 \overline{) 972} \\ - 72 \quad | \\ \hline 252 \\ - 252 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 32 \text{ r } 4 \\ 6 \overline{) 196} \\ - 18 \quad | \\ \hline 16 \\ - 16 \\ \hline 0 \end{array}$$

Leading to Bus Stop Method

$$\begin{array}{r} 39 \\ 9 \overline{) 351} \end{array}$$

$$\begin{array}{r} 57 \text{ r } 2 \\ 8 \overline{) 458} \end{array}$$