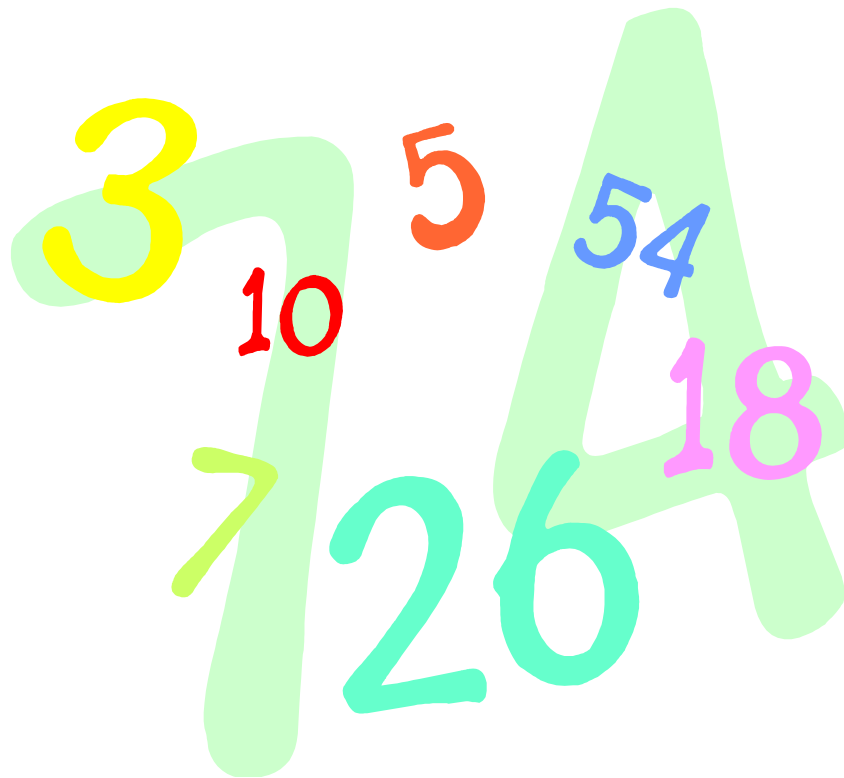




Learning Together Achieving Forever

PORTWAY'S MARVELLOUS MATHS!





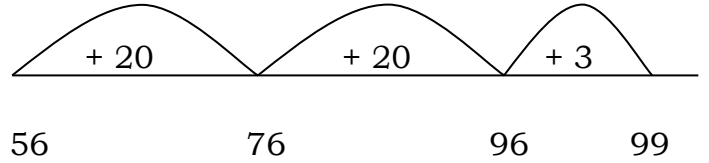
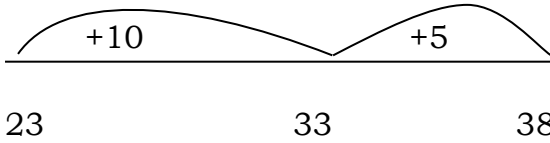
ADDITION



Stage 1: Numberlines. *(Children can work in jumps of any number they are confident with)*

$$23 + 15 = 38$$

$$56 + 43 = 99$$



The larger number from the calculation, always goes at the beginning of the numberline.

Stage 2: Partitioning.

$$23 + 15 = 38$$

$$20 + 10 = 30$$

$$3 + 5 = 8$$

$$56 + 43 = 99$$

$$50 + 40 = 90$$

$$6 + 3 = 9$$

Stage 3: Expanded Column Method.

$$\begin{array}{r}
 20 + 3 \\
 10 + 5 \\
 \hline
 30 + 8 = 38
 \end{array}$$

$$\begin{array}{r}
 50 + 6 \\
 40 + 3 \\
 \hline
 90 + 9 = 99
 \end{array}$$

Stage 4: Column Method (Part 1).

$$\begin{array}{r}
 23 \\
 +15 \\
 \hline
 30 \text{ (20+10)} \\
 + 8 \text{ (3+8)} \\
 \hline
 38
 \end{array}$$

$$\begin{array}{r}
 56 \\
 + 43 \\
 \hline
 9 \text{ (6+3)} \\
 + 90 \text{ (50+40)} \\
 \hline
 99
 \end{array}$$

$$\begin{array}{r}
 57 \\
 + 64 \\
 \hline
 11 \text{ (7+4)} \\
 +110 \text{ (50+60)} \\
 \hline
 121
 \end{array}$$

Stage 5: Column Method (Part 2). *(Only to be used once working at level 5)*

$$\begin{array}{r}
 56 \\
 + 43 \\
 \hline
 99
 \end{array}$$

$$\begin{array}{r}
 57 \\
 + 64 \\
 \hline
 121
 \end{array}$$

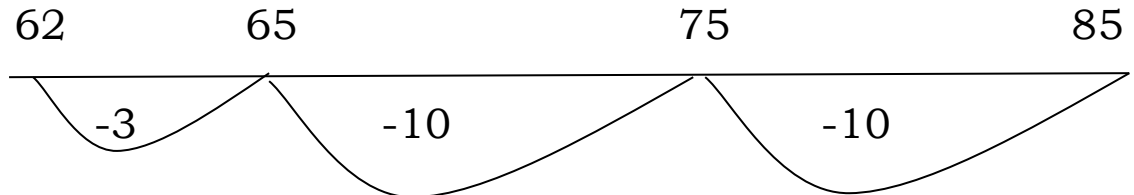


SUBTRACTION



Stage 1: Numberlines. (Start at the opposite end of the number line to when doing addition and loop underneath the line to remember the difference between the two operations)

$$85 - 23 = 62$$



Stage 2: Partitioning. (The number in the box is the number NOT partitioned.)

$$\boxed{64} - 21 = \quad \quad \quad 64 - 20 = 44$$

$$\quad \quad \quad \quad \quad \quad \quad 44 - 1 = 43$$

Stage 3: Expanded Column Method. (Say 'AND' at the addition signs so children see the number has been partitioned. In the second example children have to understand that 60 can be partitioned into a 50 and a 10 so they understand where the 10 is taken from before they move onto exchanging 10s in a more complex method)

$$64 - 21 = 43$$

$$\begin{array}{r} 60 + 4 \\ - 20 + 1 \\ \hline 40 + 3 = 43 \end{array}$$

(60 AND 4 subtract 20 AND 1)

$$64 - 29 = 35$$

$$\begin{array}{r} 50 \cancel{60} + 14 \\ - 20 + 9 \\ \hline 30 + 5 = 35 \end{array}$$

Stage 4: Negative Number Method. (Only when understanding is very secure in Y6)

$$64 - 29 = 35$$

$$\begin{array}{r} 64 \\ - 29 \\ \hline 40 \quad (60 - 20) \\ -5 \quad (4 - 9) \\ \hline 35 \end{array}$$

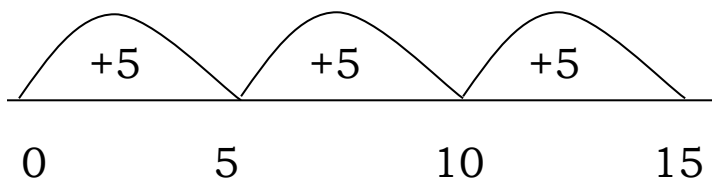
then $\begin{array}{r} 34^{10} \\ - 5 \\ \hline 35 \end{array}$

MULTIPLICATION

Stage 1: Repeated Addition

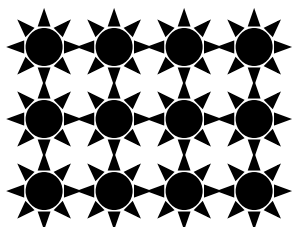
$$3 \times 5 = 15$$

$$\text{OR } 5 + 5 + 5 = 15$$

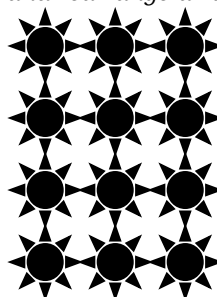


Stage 2: Arrays. *(Children should use equipment to make and rearrange arrays.)*

$$4 \times 3 = 12$$



OR...



Stage 3: The Grid Method (Part 1).

$$13 \times 7 = 91$$

X	10	3	
7	70	21	= 91

Stage 4: The Grid Method (Part 2).

$$72 \times 34 = 2448$$

X	70	2	
30	2100	60	= 2160
4	280	8	= 288

NB: Helpful Hint:

When reminding children to check answers to calculations such as 70×30 , remind them of the following number facts that they should know.

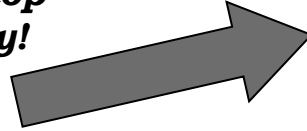
*$7 \times 3 = 21$
so $70 \times 3 = 210$
so $70 \times 30 = 2100$*

Their understanding of multiplying by 10, 100, 1000 should be applied here.

Stage 5: Compact Method

$$\begin{array}{r} 23 \\ \times 35 \\ \hline 15 \text{ (3 x 5)} \\ 100 \text{ (20 x 5)} \\ 90 \text{ (3 x 30)} \\ +600 \text{ (20 x 30)} \\ \hline 805 \end{array}$$

*This then
leads to the
following
method for
**Year 6 top
set only!***

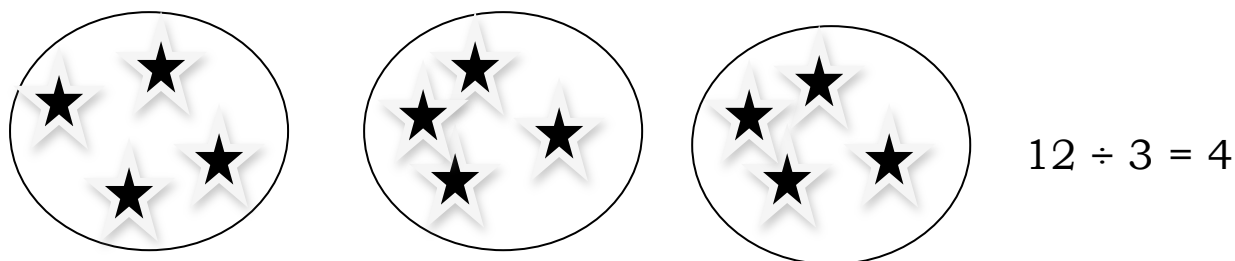


$$\begin{array}{r} 13 \\ \times 7 \\ \hline 21 \text{ (3 x 7)} \\ +70 \text{ (10 x 7)} \\ \hline 91 \end{array}$$

DIVISION

Stage 1: The Concrete Approach

Sharing physical objects into groups and drawing the calculation.



Solving practical problems:

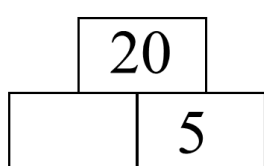
- Each table can seat 5 children. There are 20 children in the class. There must be the same number of children at each table. How many children will there be at each table?

Include remainders with practical problems:

- Mrs Robinson brings a new child to our class. There are now 21 children and each table seats 5 children. How many tables will we need for every child to have a seat?

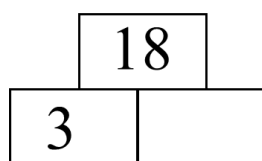
Children should show their working out through drawings and simple number sentences as shown above.

Stage 2: Number sentences – making use of multiplication knowledge of arrays. NO remainders with this method. (This method reinforces and relies on confidence times tables knowledge)



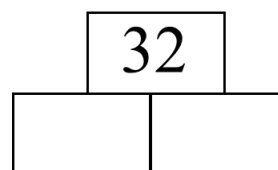
$$\square \times 5 = 20$$

$$20 \div 5 = \square$$



$$3 \times \triangle = 18$$

$$18 \div 3 = \triangle$$



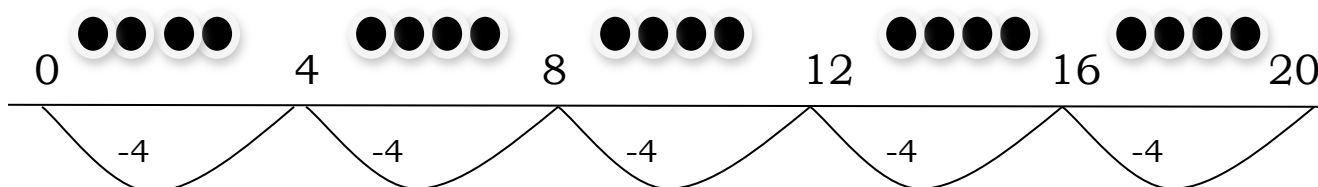
$$\square \times \circ = 32$$

$$32 \div \circ = \square$$

Complete these number sentences in as many ways as you can.

Stage 3: Repeated subtraction – groups of counters used to illustrate. Reference should be made here to learning completed at stage 1.

$$20 \div 4 = 5$$



Stage 4: Simple Chunking – reference should be made to knowledge of multiplication tables.

$$20 \div 4 = 5$$

$$\begin{array}{r} 20 \\ - 8 \text{ (2 x 4)} \\ \hline 12 \\ - 12 \text{ (3 x 4)} \\ \hline 0 \end{array}$$

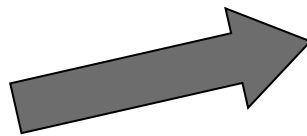
After completing the calculation on the left, teach the children to add the **groups of 4** (emboldened and underlined) they have subtracted. This will then give them the answer to the calculation.

Stage 5: Chunking

$$172 \div 5 = 34 \text{ r}2$$

$$\begin{array}{r} 172 \\ - 50 \text{ (10 x 5)} \\ \hline 122 \\ - 50 \text{ (10 x 5)} \\ \hline 72 \\ - 50 \text{ (10 x 5)} \\ \hline 22 \\ - 20 \text{ (4 x 5)} \\ \hline 2 \end{array}$$

The more condensed method for when children are ready only!



$$172 \div 5 = 34 \text{ r}2$$

$$\begin{array}{r} 172 \\ - 100 \text{ (20 x 5)} \\ \hline 72 \\ - 70 \text{ (14 x 5)} \\ \hline 2 \end{array}$$

The examples above subtract 50 each time as we are using the 5 times tables. To subtract 5 each time would be very inefficient so we subtract 50 as it is ten lots of five. (Ten lots of any number is generally known by most children, which makes it a good fact to begin with)

As children become more confident with their times tables knowledge they will be able to subtract in larger 'chunks' as shown in the second example.