



# Progression in Addition



## Using pictures and objects

4 bears add two bears equals 6 bears

Use Numicon to see the number increase in size

2 + 5 = 7

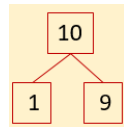
I know that's 10  
 ↓  
 ☺ put it in my head

count on  
 11, 12, 13, 14

10 add 4 more is 14

## Recording your number work and using known facts

"I know that  $10 - 9 = 1$  so  $9 + 1 = 10$ "



At this stage children begin to use the symbols + and =

## Using tracks, marked number lines and empty number lines

2 + 3 = 5  
 2 bears add 3 more is 5

Number track

5 + 4 = 9

Marked number line

15 + 8 = 23

Empty number line

## Expanded written method

47 + 76 =

47 + 76  
 40 + 7 + 70 + 6  
 110 + 13  
 = 123

## Expanded column method

$$\begin{array}{r} 47 \\ + 76 \\ \hline 110 \\ 13 \\ \hline 123 \end{array}$$
 (Tens first)

OR

$$\begin{array}{r} 47 \\ + 76 \\ \hline 13 \\ 110 \\ \hline 123 \end{array}$$
 (Units first)

## Compact written method

$$\begin{array}{r} 366 \\ + 458 \\ \hline 824 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 2,456,179 \\ + 4,264,232 \\ \hline 6,720,411 \\ \hline 11 \quad 11 \end{array}$$

$$\begin{array}{r} 124.90 \\ + 7.25 \\ \hline 132.15 \\ \hline 11 \end{array}$$

# Progression in Subtraction

## Using pictures and objects

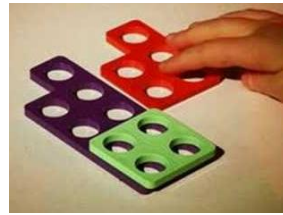
There are 6 balloons and 2 pop, how many are left?



Which line has the most? How many more?



$$9 - 5 = 4$$



$$10 - 2 = 8$$



## Recording your number work and using known facts

"I know that  $9 + 1 = 10$  so  $10 - 1 = 9$ "

$$93 - 76$$

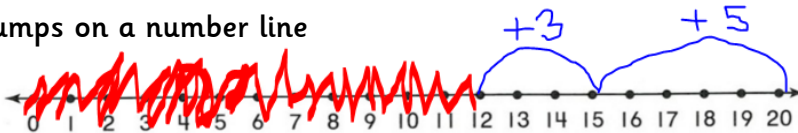
It's easier to work out  $93 - 73$ , that's 20

Then I need to count back 3 more so I've taken 76 away, that's 17  
So  $93 - 76 = 17$

At this stage children begin to use the symbols

- and =

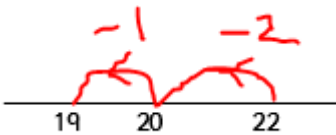
## Jumps on a number line



$$20 - 12 = 8$$

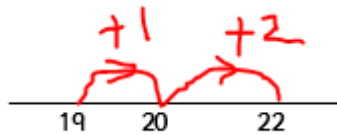
## Using tracks, marked number lines and empty number lines

$$22 - 3 = 19$$

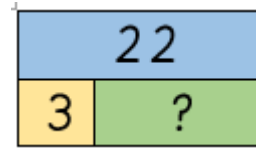


Work this way and count back

$$22 - 19 = 3$$



Work this way and count up



Bar models are used to solve missing number problems

$$22 - \square = 3$$

## Expanded written methods

Counting up

$$\begin{array}{r} 74 \\ - 27 \\ \hline 3 \text{ } (\rightarrow 30) \\ 40 \text{ } (\rightarrow 70) \\ 4 \text{ } (\rightarrow 74) \\ \hline 47 \end{array}$$

Counting up

$$74 - 27$$

$$\begin{array}{r} 70 + 4 \\ - 20 + 7 \\ \hline 40 + 7 \\ 47 \end{array}$$

Regrouping

Think: I have 3 tens and 4 ones. I want to take away 9 ones.

Think: I need more ones. I will regroup 1 ten as 10 ones.

Think: I now have 2 tens and 14 ones so I can take away 9 ones, leaving 2 tens and 5 ones.

Workmat

Tens	Ones
3	4

Workmat

Tens	Ones
2	14

Workmat

Tens	Ones
2	5

2 tens 5 ones = 25

## Compact written method

$$419 - 297$$

$$\begin{array}{r} 419 \\ - 297 \\ \hline 122 \end{array}$$

$$2410 - 482$$

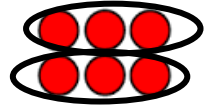
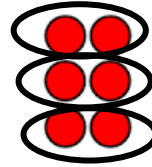
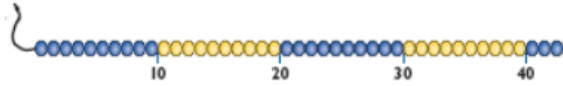
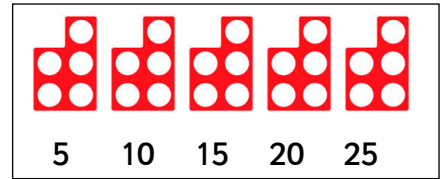
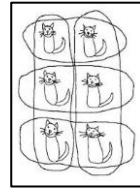
$$\begin{array}{r} 2410 \\ - 482 \\ \hline 1928 \end{array}$$

# X

## Progression in Multiplication

# X

### Using pictures and objects



Make the queue twice as long



3 lots of 2 is the same as 2 lots of 3  
 $2 + 2 + 2 = 3 + 3$

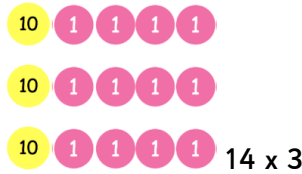
### Recording your number work and using known facts

"I know that double 5 is 10."

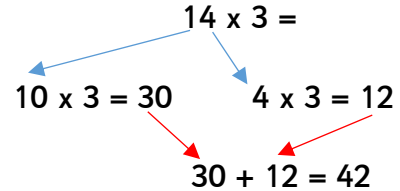
What is the value of six 2p coins?

12					
2	2	2	2	2	2

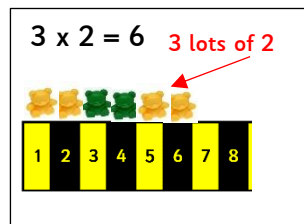
Place value counters



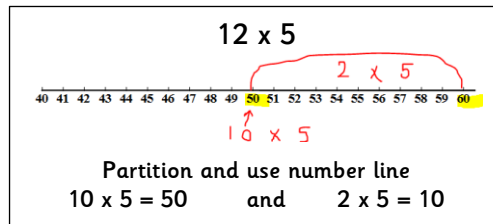
Mental multiplication using partitioning:



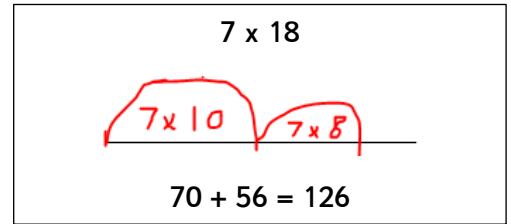
### Using tracks, marked number lines and empty number lines



Number track



Marked number line



Empty number line

Grid method

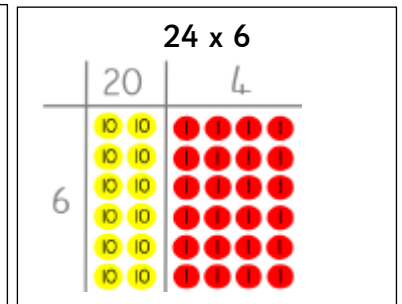
$38 \times 7$		
X	30	8
7	210	56

Expanded method

$38 \times 7$

30 + 8	
X	7
210	( $30 \times 7 = 210$ )
56	( $8 \times 7 = 56$ )
266	

Place value counters



Links to

### Short multiplication

$24 \times 6$ becomes	$2741 \times 6$ becomes
$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ 2 \end{array}$	$\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \\ 42 \end{array}$
Answer: 144	Answer: 16446



Leads to

### Long multiplication

$24 \times 16$ becomes	$124 \times 26$ becomes
$\begin{array}{r} 24 \\ \times 16 \\ \hline 144 \\ 240 \\ \hline 384 \end{array}$	$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ 11 \end{array}$
Answer: 384	Answer: 3224



# Progression in Division



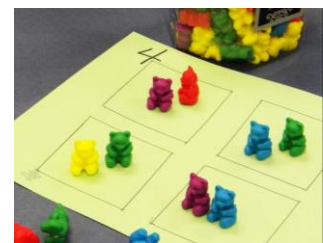
## Using pictures and objects



How many cars can you make if you have 8 wheels?



If we cut the cake in  $\frac{1}{2}$  how many pieces will there be?



Put the same number of bears in each house.

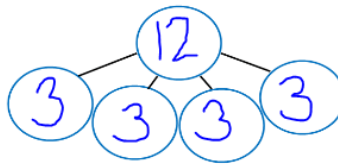
## Recording your number work and using known facts

$$24 \div 4$$

$$4 + 4 + 4 + 4 + 4 + 4 = 24$$

Answer:  $24 \div 4 = 6$

Share 12 sweets between 4 people



How many groups of 4 in 12?

$$12 \div 4$$

12		
4	4	4

## Using tracks, marked number lines and empty number lines

$$48 \div 6 = 8$$



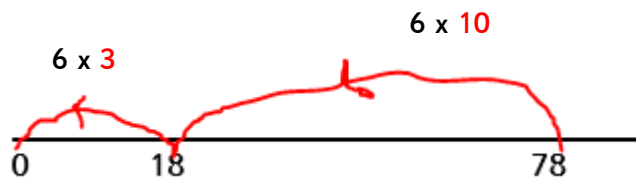
0 6 12 18 24 30 36 42

6-6 12-6 18-6 24-6 30-6 36-6 42-6 48-6

How many 6's have been subtracted?

That means, there are 8 sixes in 48!

Repeated subtraction



$$78 \div 6 = 13$$

Using tables facts

## Expanded written method - Chunking

$$72 \div 5$$

$$\begin{array}{r} 72 \\ - 50 \quad (10 \times 5) \\ \hline 22 \\ - 20 \quad (4 \times 5) \\ \hline 2 \end{array}$$

Answer: 14 remainder 2

$$196 \div 6$$

$$\begin{array}{r} 196 \\ - 60 \quad (10 \times 6) \\ \hline 136 \\ - 60 \quad (10 \times 6) \\ \hline 76 \\ - 60 \quad (10 \times 6) \\ \hline 16 \\ - 12 \quad (2 \times 6) \\ \hline 4 \end{array}$$

Answer: 32 remainder 4

## Short division

98 ÷ 7 becomes

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \phantom{0} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

Answer: 14

432 ÷ 5 becomes

$$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \phantom{0} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Answer: 86 remainder 2



Leads to

## Long division

432 ÷ 15 becomes

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{30} \phantom{0} \\ 132 \\ \underline{120} \\ 12 \end{array}$$

## Place value counters

92 ÷ 4

$$\begin{array}{r} 2 \\ 4 \overline{) 92} \end{array}$$

