



Progression in Written Calculation

National Curriculum 2014

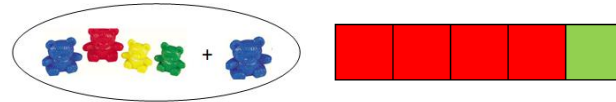
Addition



Jottings and Manipulatives

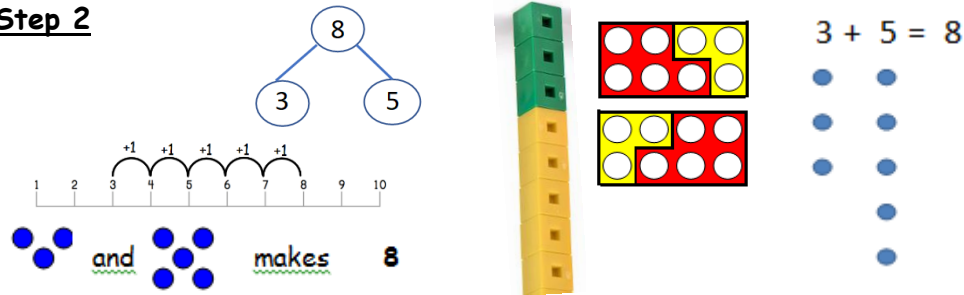
Written Calculations

Step 1



$$4 + 1 = 5$$

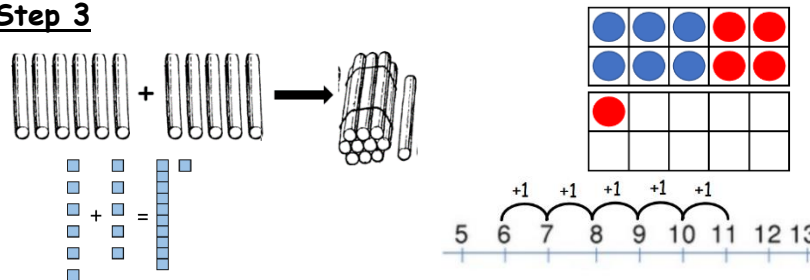
Step 2



$$5 + 3 = 8$$

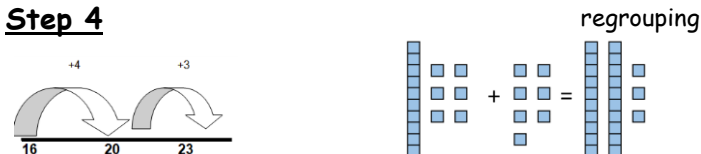
$$(3 + 5 = 8)$$

Step 3



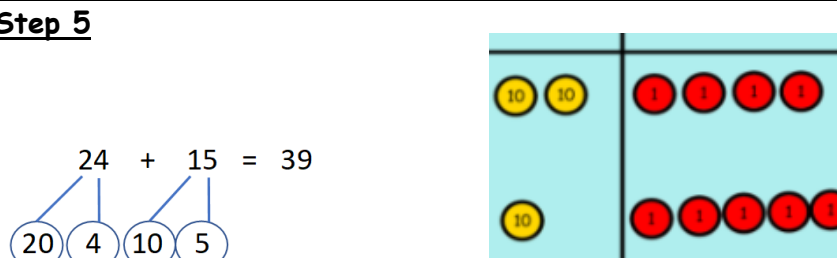
$$6 + 5 = 11$$

Step 4



$$16 + 7 = 23$$

Step 5



$$24 + 15 = 39$$

$$\begin{array}{r} \text{T O} \\ 24 \\ + 15 \\ \hline 9 \\ 30 \\ \hline 39 \end{array}$$

Readiness for formal written methods

- Count up from 0
- Count objects touching each object in turn.
- Read and write numbers to 10
- Count on using fingers
- Count up from numbers other than 0.
- Make a set of objects
- Understand the place value of 2-digit numbers
- Count on in multiples of ten

Equipment

- Toys and cubes
- Bead Strings
- Numicon
- Dienes and straws
- Number lines
- Place Value counters
- Tens frames

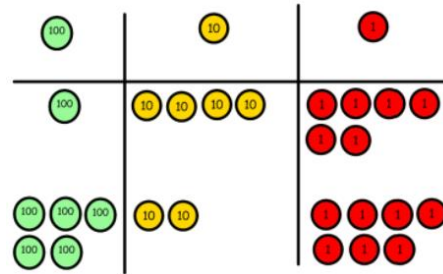
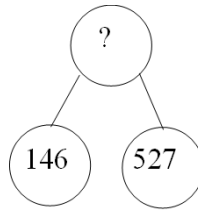
Addition



Jottings and Manipulatives

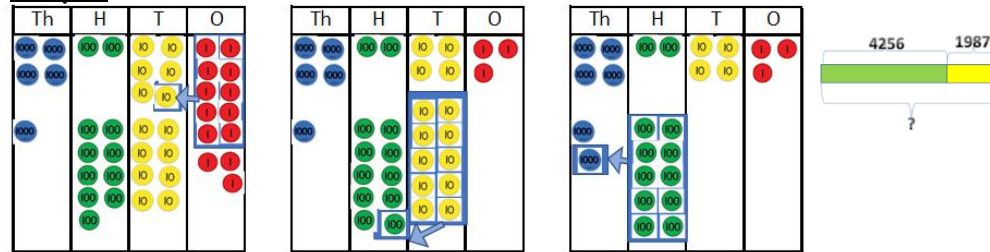
Written Calculations

Step 6



$$\begin{array}{r}
 \text{H} \quad \text{T} \quad \text{O} \\
 1 \quad 4 \quad 6 \\
 + 5 \quad 2 \quad 7 \\
 \hline
 1 \quad 3 \\
 6 \quad 0 \\
 \hline
 6 \quad 0 \quad 0 \\
 \hline
 6 \quad 7 \quad 3
 \end{array}$$

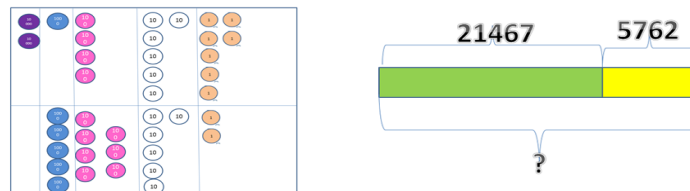
Step 7



$$\begin{array}{r}
 \text{Th} \quad \text{H} \quad \text{T} \quad \text{O} \\
 4 \quad 2 \quad 5 \quad 6 \\
 + 1 \quad 9 \quad 8 \quad 7 \\
 \hline
 1 \quad 3 \\
 1 \quad 3 \quad 0 \\
 1 \quad 1 \quad 0 \quad 0 \\
 5 \quad 0 \quad 0 \quad 0 \\
 \hline
 6 \quad 2 \quad 4 \quad 3
 \end{array}$$

Step 8

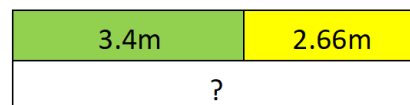
21467 holiday makers flew from Birmingham airport in June and 5762 holiday makers in July. How many people altogether flew from the airport in June and July?



$$\begin{array}{r}
 2 \quad 1 \quad 4 \quad 6 \quad 7 \\
 + \quad 5 \quad 7 \quad 6 \quad 2 \\
 \hline
 2 \quad 7 \quad 2 \quad 2 \quad 9 \\
 \hline
 1 \quad 1
 \end{array}$$

Step 9

2.66 m of string is added to 3.4 m of string. How long is the piece of string now?



$$\begin{array}{r}
 2.66 \\
 + 3.40 \\
 \hline
 6.06
 \end{array}$$

Place holder is written in

6.06 metres of string

Readiness for formal written methods

- Understand the place value of numbers to 100,000
- Count on in multiples of ten, hundred and thousand.
- Understand how to rename ten ones for one ten etc.
- Understand place value for decimal numbers
- Understand how to write numbers vertically in the correct columns.
- Round to estimate answers

Equipment

- Place value counters
- Bar models
- Number lines



Subtraction



Jottings and Manipulatives

Written Calculations

Step 1

5 take away 2 makes 3

$$5 - 2 = 3$$

Step 2

$$14 - 6 = 8$$

Step 3

$$45 - 13 = 32$$

Step 4

$$53 - 38 = 15$$

	T	O
	5	13
-	3	8
	1	5

Readiness for formal written methods

- ✦ Rhymes and songs
- ✦ Writing digits
- ✦ Counting back from 10
- ✦ Counting back from other numbers
- ✦ Counting back in tens
- ✦ Understanding the language: less, take away, left
- ✦ Place value understanding
- ✦ Understanding that the biggest number comes first.
- ✦ Fact family knowledge from Big Maths.

Equipment

- ✦ Toys and cubes
- ✦ Ten frames
- ✦ Place value counters
- ✦ Numberlines
- ✦ Bar models

Multiplication



Jottings and Manipulatives

Written Calculation

Step 1

There are 5 cakes in a pack. How many cakes in 2 packs?
Children use dots or tally marks to group items together.

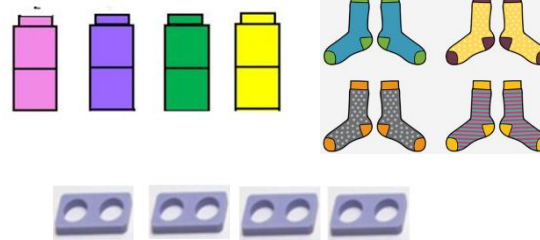
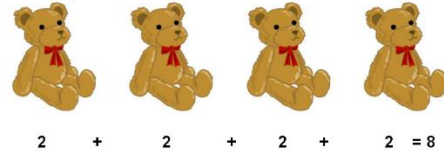


$$\text{Double 5 is 10}$$

$$5 + 5 = 10$$

Step 2

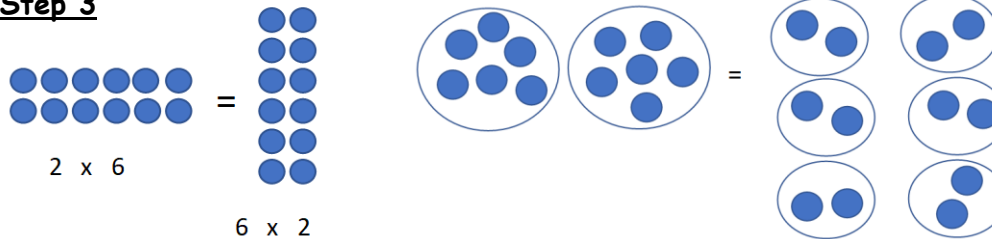
How many ears will 4 teddies have?



$$2 + 2 + 2 + 2 = 8$$

$$4 \times 2 = 8$$

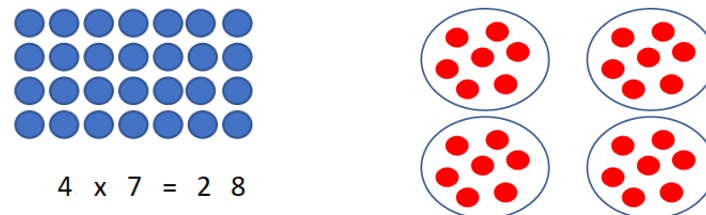
Step 3



$$2 \times 6 = 12$$

$$6 \times 2 = 12$$

Step 4



$$4 \times 7 = 28$$

Readiness for formal written methods

- Count objects reliably
- Group objects into equal groups
- Count in steps of 2, 5, 10 and 3
- Continue number sequences counting in regular steps
- Find doubles of numbers to 10 then 20.
- Understand the place value of 2-digit numbers
- Understand what happens when numbers are multiplied by ten
- Solve vertical addition calculations accurately

Equipment

- Toys and cubes
- Set rings / hoops
- Numicon
- Number lines
- Dienes / straws

Multiplication



Jottings and Manipulatives

Written Calculation

Step 5 Four books were sold. Each book cost £13. How much money was taken?

$$\begin{array}{r} x \quad 10 \quad 3 \\ 4 \quad 40 \quad 12 \end{array} \rightarrow 52$$

$$13 \times 4 = 52$$

Step 6

$$\begin{array}{r} x \quad 30 \quad 4 \\ 6 \quad 180 \quad 24 \end{array} \rightarrow 204$$

$$34 \times 6 = 204$$

Step 7

$$\begin{array}{r} x \quad 10 \quad 8 \\ 10 \quad 100 \quad 80 \\ 3 \quad 30 \quad 24 \end{array} \rightarrow 180 + 54 = 234$$

Using place value paper

$$18 \times 13 = 234$$

$$\begin{array}{r} 18 \\ x 13 \\ \hline 24 \\ 30 \\ \hline 234 \end{array} \quad \begin{array}{r} 18 \\ x 13 \\ \hline 54 \\ 180 \\ \hline 234 \end{array}$$

Step 8

$$\begin{array}{r} x \quad 30 \quad 4 \quad 0 \quad 0 \quad 8 \\ 8 \quad 24 \quad 32 \quad 0 \quad 6 \quad 4 \\ \hline 240 \quad 240 \quad 240 \\ + \quad 064 \\ \hline 2784 \end{array}$$

Place holders are written in

$$3.48 \times 8 = 27.84$$

$$\begin{array}{r} 3.48 \\ x 8 \\ \hline 27.84 \end{array}$$

Readiness for formal written methods

- Count objects reliably
- Group objects into equal groups
- Count in steps of 2, 5, 10 and 3
- Continue number sequences counting in regular steps
- Find doubles of numbers to 10 then 20.
- Understand the place value of 2-digit numbers
- Understand what happens when numbers are multiplied by ten
- Solve vertical addition calculations accurately

Equipment

- Place value counters
- Array paper
- Bar models
- Diennes

Division



Manipulatives and Jottings

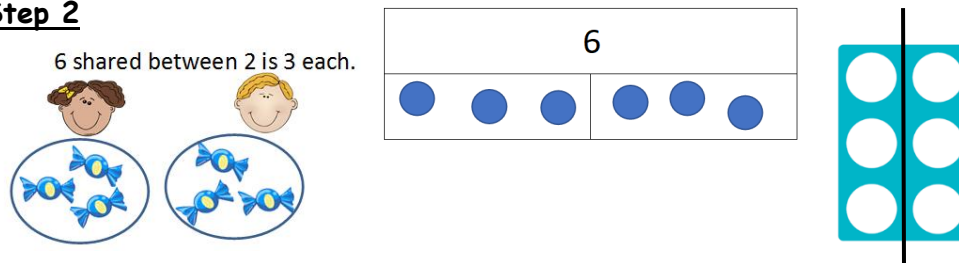
Written Calculation

Step 1



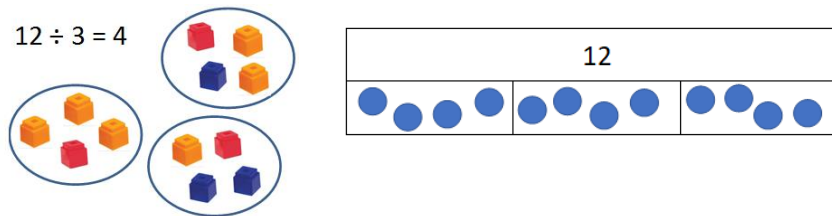
Finding half of something practically
Sharing between two

Step 2



6 shared between 2 is 3
($6 \div 2 = 3$)

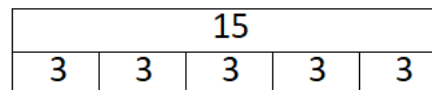
Step 3



$12 \div 3 = 4$

Step 4

How many groups of 3 are in 15?



$15 \div 3 = 5$

$15 \div 3 = 5$

$15 \div 5 = 3$

Readiness for formal written methods

- Count objects reliably
- Share objects with a friend – one for you, one for me.
- Share objects into set rings.
- Meet and understand the division sign
- Understand the language of division
- Understand that when we share things, it needs to be equal, or a fair share.

Equipment

- Toys and cubes
- Set rings / hoops
- Numicon
- Bar models
- Dienes / straws

