

# Parents' Calculation Policy Workshop



## Key Stage 2

13th November 2019

Miss Jane



# Whiterose and the Calculation Policy

- Mastery of Maths
- Adapted Whiterose
- Concrete
- Pictorial
- Abstract
- Discussion with staff

# Addition

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as

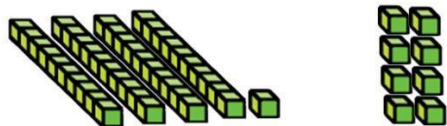


## 1 Concrete

### TO + O using base 10.

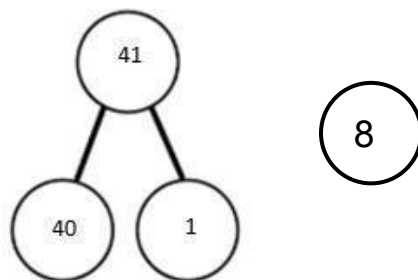
Continue to develop understanding of partitioning and place value.

$$41 + 8$$



## 2 Pictorial

Children to partition into tens and ones.  $41 + 8$



## 3 Abstract

$$41 + 8$$

$$1 + 8 = 9$$

$$40 + 9 = 49$$

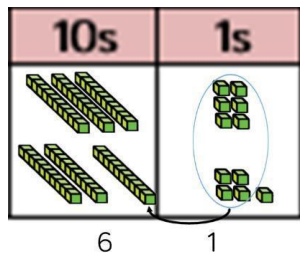
	4	1
+		8
<hr/>		
	4	9

# Addition

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as

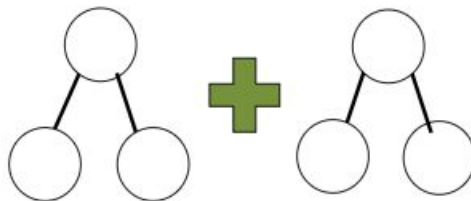
## 1 Concrete

**TO + TO using base 10.**  
Continue to develop an understanding of partitioning and place value.  $36 + 25$



## 2 Pictorial

Children to partition into tens and ones.  $36 + 25$



## 3 Abstract

$36 + 25 =$

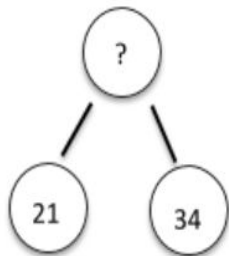
$$\begin{array}{r}
 36 \\
 +25 \\
 \hline
 61 \\
 \hline
 1
 \end{array}$$

# Addition

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as



## Conceptual Variation; different ways to solve TO + TO



Word problems (21+34)

In year 3, there are 21 children, and in year 4, there are 34 children. How many children are there in total?

$21 + 34 = 55$ . Prove it.

$$\begin{array}{r} 21 \\ +34 \\ \hline \end{array}$$

$$\square = 21 + 34$$

Calculate the sum of twenty-one and thirty-four.



Missing digit problems

$$\begin{array}{r} 21 \\ +3\square \\ \hline \square 5 \end{array}$$

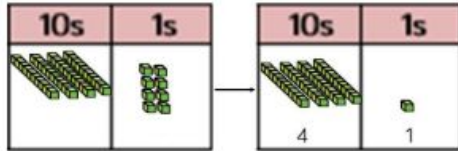
# Subtraction

Key Language: Take away, less than, the difference, subtract, minus, fewer, decrease



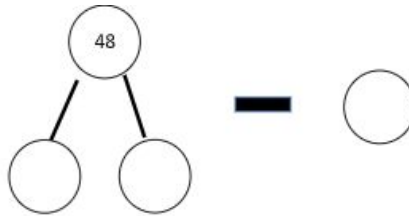
## 1 Concrete

**Column method** using base 10.  
48-7



## 2 Pictorial

Children to represent the base 10 pictorially.



## 3 Abstract

Column method or children could count back 7.

	4	8
-		7
	4	1

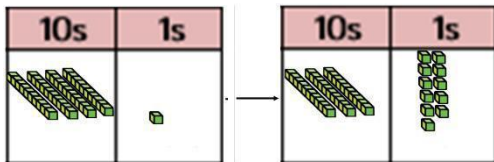
# Subtraction

Key Language: Take away, less than, the difference, subtract, minus, fewer, decrease



## 1 Concrete

**Column method** using base 10 and having to exchange.  $41 - 26$



## 2 Pictorial

Represent the base 10 pictorially, remembering to show the exchange.

T	O
30 40	10 + 1
20	6

## 3 Abstract

Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because  $41 = 30 + 11$ .

	<del>3</del> 4	1
-	2	6
	1	5

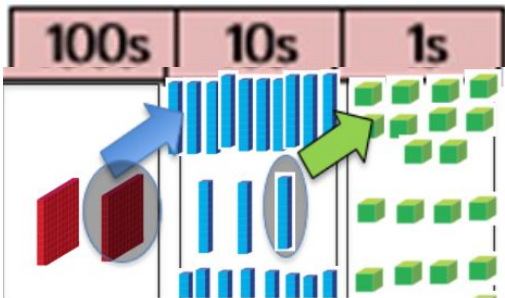
# Subtraction

Key Language: Take away, less than, the difference, subtract, minus, fewer, decrease



## 1 Concrete

Column method using dienes.  
 $234 - 88$



## 2 Pictorial

Represent the place value counters pictorially; remembering to show what has been exchanged.

H	T	O
100 200	30 10 + 20	10 + 4
	80	8

## 3 Abstract

Formal column method.  
Children must understand what has happened when they have crossed out digits.

$$\begin{array}{r} 2\cancel{3}^1\cancel{4}^1 \\ - 88 \\ \hline 6 \end{array}$$

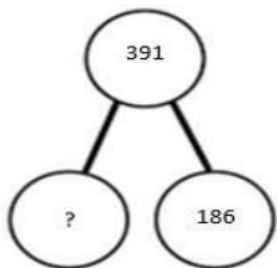


# Subtraction

Key Language: Take away, less than, the difference, subtract, minus, fewer, decrease



## Conceptual Variation; different ways to ask children to solve 391-186



Raj spent £391, Timmy spent £186. How much more did Raj spend?

Calculate the difference between 391 and 186.

$$\square = 391 - 186$$

391

-186

—

What is 186 less than 391?

Missing digit calculations

$$\begin{array}{r} 39\square \\ - \square\square 6 \\ \hline \square 0 5 \end{array}$$

# Multiplication

Key Language: double, times, multiplied by, the product of, groups of, lots of equal groups.



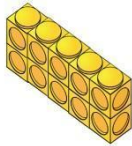
## 1 Concrete

Use arrays to illustrate **commutativity** counters and other objects can also be used.

$$2 \times 5 = 5 \times 2$$



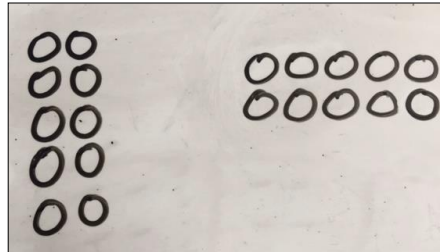
2 lots of 5



5 lots of 2

## 2 Pictorial

Children to represent the arrays pictorially (e.g. theatre rows).



## 3 Abstract

Children to be able to use an array to write a range of calculations e.g.

$$10 = 2 \times 5$$

$$5 \times 2 = 10$$

$$2 + 2 + 2 + 2 + 2 = 10$$

$$10 = 5 + 5$$

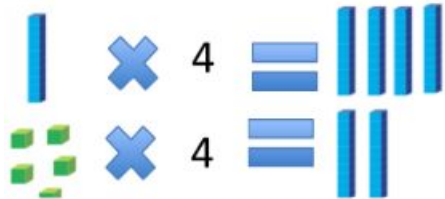
# Multiplication

Key Language: double, times, multiplied by, the product of, groups of, lots of equal groups.



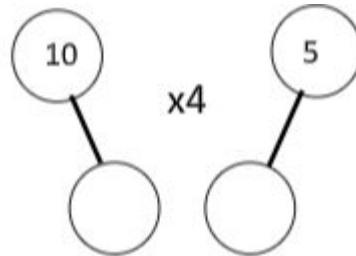
## 1 Concrete

**Partition to multiply** using base 10 (dienes)  
 $15 \times 4$



## 2 Pictorial

Children to represent the concrete manipulatives pictorially.



## 3 Abstract

Children to be encouraged to show the steps they have taken.

X	10	5
4	40	20

Then,  $40 + 20 = 60$



# Multiplication

Key Language: double, times, multiplied by, the product of, groups of, lots of equal groups.

1

## Formal column method

go straight from grid method to column method  $3 \times 23$  and  $23 \times 6$

Children may need to record what it is they are doing to show understanding.

$$3 \times 23 \quad 3 \times 20 = 60$$

$$3 \times 3 = 9$$

$$20 \quad 3 \quad 60 + 9 = 69$$

2

$$\begin{array}{r} 23 \\ \times 3 \\ \hline 69 \end{array}$$

$$\begin{array}{r} 23 \\ \times 6 \\ \hline 138 \\ 11 \end{array}$$

# Multiplication

Key Language: double, times, multiplied by, the product of, groups of, lots of equal groups.



## Conceptual Variation; different ways to solve $6 \times 23$

Mai had to swim 23 lengths, 6 times a week.  
How many lengths did she swim in one week?

Find the product of 6 and 23  $6 \times 23 =$

$$= 6 \times 23$$

$$\begin{array}{r} 6 \\ \times 23 \\ \hline \end{array} \qquad \begin{array}{r} 23 \\ \times 6 \\ \hline \end{array}$$

# Division

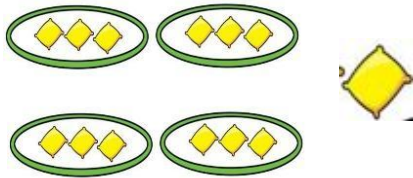
Key Language: Share, group, divide, divided by, half.



## 1 Concrete

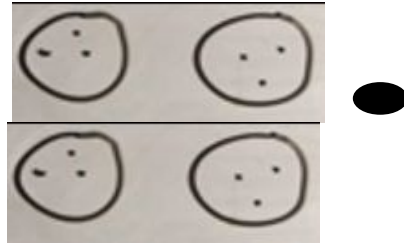
**2d ÷ 1d with remainders**  
using sharing.

$$13 \div 3$$



## 2 Pictorial

Children to represent the sharing pictorially



There are 4 groups with 1 left over

## 3 Abstract

$$13 \div 4 = 3 \text{ remainder } 1$$

Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line.

'3 groups of 4, with 1 left over'

# Division

Key Language: Share, group, divide, divided by, half.



## 1 | Concrete

### Division using chunking method

$$42 \div 3$$

## 3 | Abstract

Children need to be able to use chunking method to make sense of place value when sharing.

$$\begin{array}{r} 14 \\ 3 \overline{) 42} \\ \underline{- 30} \phantom{0} \\ 12 \\ \underline{- 12} \\ 0 \end{array} \quad \begin{array}{l} 3 \times 10 \\ 3 \times 4 \end{array} \quad \left. \vphantom{\begin{array}{r} 14 \\ 3 \overline{) 42} \\ \underline{- 30} \phantom{0} \\ 12 \\ \underline{- 12} \\ 0 \end{array}} \right\} 14$$

# Division

Key Language: Share, group, divide, divided by, half.



1 | Concrete

## Short division

$$615 \div 5$$

3 | Abstract

Children calculate using the short division scaffold.

$$\begin{array}{r} 123 \\ 5 \overline{) 615} \end{array}$$



# Division

Key Language: Share, group, divide, divided by, half.



## Abstract

2544 ÷ 12

$$\begin{array}{r} 021 \\ 12 \overline{) 2544} \\ \underline{24} \\ 1 \end{array}$$

$$\begin{array}{r} 021 \\ 12 \overline{) 2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 2 \end{array}$$

$$\begin{array}{r} 0212 \\ 12 \overline{) 2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

# Division

Key Language: Share, group, divide, divided by, half.



## Conceptual Variation; different ways to solve $6 \times 23$

I have £615 and share it equally between 5 bank accounts. How much will be in each account?

615 pupils need to be put into 5 groups. How many will be in each group?

$$5 \overline{)615}$$

$$615 \div 5 =$$

$$\boxed{123} \div 5$$



# Homework Ideas

- Number plates - making a number sentence
- Shapes in the environment
- Shopping - weighing/counting
- Travelling - estimating time and distance

# Thank you!

If you have any further questions  
or queries please contact:

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