



## Wallisdean Infant School Mathematics Calculation Policy

### Recording Methods for Foundation Stage to Year 2

#### Aims and Rationale

Children are introduced to the processes of calculation through practical, oral, pictorial and mental activities. As children begin to understand the underlying ideas, they develop ways of:-

- Recording to support their thinking and calculation methods
- Using particular methods that apply to special cases
- Interpreting and using the signs and symbols involved

As children's methods are strengthened and refined, so too are their informal written methods. These methods become more efficient and lead to efficient written methods that can be used more generally.

Early practical, pictorial, oral and mental work *must lay the foundations* by providing children with a good understanding of:-



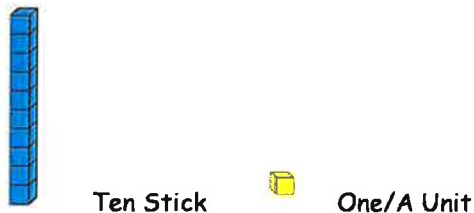
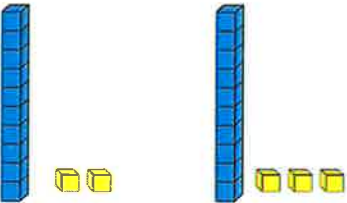
- How the four operations build on efficient counting strategies
- Place value
- Number facts

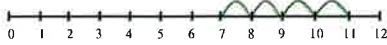
The use of concrete (real objects), pictorial and abstract methods are all equally important in ensuring that children fully understand the process of calculations and what happens to the numbers and why. At the beginning, the children will begin by using concrete and oral methods. They will move towards using pictorial methods alongside these to consolidate their understanding, eventually moving towards abstract written methods. It is important that children go through this process of methods when learning any new topic in mathematics to ensure that they fully understand the process of the calculation.

**Recording Methods**

<b>Foundation</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
<b>DRAWING PICTURES AND MARKS</b>			
	<b>USING SIGNS AND SYMBOLS</b>		
	<b>NUMBER LINES</b>		
		<b>DRAWING NUMBER LINES</b>	
	<b>EXPLAINING IN WORDS</b>		
		<b>USING INFORMAL JOTTINGS</b>	

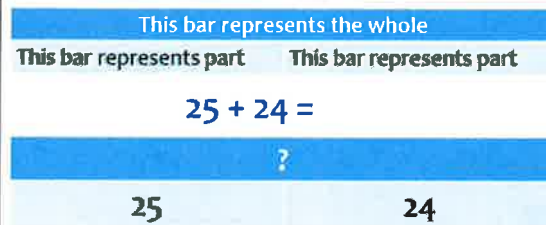
## Recording Addition Reception and Year 1

Foundation Stage	Year 1
<p><b><u>Pictures / Mark Making</u></b></p> <p>There are 3 cars in the garage. 2 more arrive. What is the total?</p>  <p>Using 2 different colours of lego, build 2 towers. How many bricks are there altogether?</p> <p>Dot cards representing numbers</p>	<p><b><u>Pictures / marks</u></b></p> <p>Lisa has 5 lollies and Tim has 2 lollies.</p> <p>How many lollies do they have <b>altogether</b>?</p>  <p>Using materials to add up.</p>
	<p><b><u>Dienes</u></b></p> <p>Children practically use dienes to represent numbers and use them to carry out calculations. They represent the tens and the ones in each number and can be used to partition numbers as well as for calculations. They can also record these pictorially.</p>  <p style="text-align: center;">Ten Stick      One/A Unit</p>  <p style="text-align: center;">12      +      13      =      25</p>
<p><b><u>Signs and symbols</u></b></p> <p><i>(Number sentences modelled by adults)</i></p> <p>Use number and photo displays to organise the learning environment.</p> <p>Lists of combinations of numbers (adult modelling +</p>	<p><b><u>Signs and symbols</u></b></p> <p>Record own number sentences, linked to a practical example.</p> <p> <math>3 + 2 = \square</math>      <math>\square = 3 + 2</math>  <math>3 + \square = 5</math>      <math>5 = \square + 2</math>  <math>\square + 2 = 5</math>      <math>5 = 3 + \square</math>  <math>\square + \square = 5</math>      <math>5 = \square + \square</math> </p> <p>Record a partitioned number as a number sentence e.g. <math>57 = 50 + 7</math>.</p>

<p><b><u>Number lines</u></b></p> <p><i>(Prepared number tracks and lines used)</i></p> <p>Reinforce counting on a number track</p> <p>e.g How far down the number track can you throw a beanbag?</p>	<p><b><u>Number lines</u></b> (numbered) Counting on using a number line</p> <p><math>7 + 4</math></p>  <p>Leading to counting on mentally, keeping the largest number in your head.</p> <p>Recording by - drawing jumps on prepared lines and then constructing own lines</p>
<p><b><u>Informal jottings</u></b></p> <p>Drawing adding pictures e.g Can the children make 10 in a variety of ways?</p> <p>How do children find a total?</p>	<p><b><u>Informal jottings</u></b></p> <p>'Can you put something on paper to show that....?'</p> <p><i>(Teachers model jottings appropriate for larger numbers)</i></p> <p>Use diagrams to solve problems involving addition</p>
<p><b><u>Practical examples</u></b></p> <ul style="list-style-type: none"> <li>Counting real objects - In construction and small world play, provide plans for models showing numbers e.g. 10 pieces of Lego</li> <li>Begin to use number lines and count on.</li> <li>Use of practical materials for counting e.g. encouraging children to provide correct number of pennies for a ticket costing 5p</li> </ul>	<p><b><u>Practical examples</u></b></p> <ul style="list-style-type: none"> <li>Record coins which might be used to 'pay' and 'give change'</li> <li>Record spots on blank dominoes to show addition sentences</li> <li>Use hundred square to add multiples of ten</li> <li>Find different ways of putting 11 spots on three ladybirds.</li> </ul>

Bury numbers in the sand. Children have to find a number which is one **more/less** than target number.

### **Bar Model**



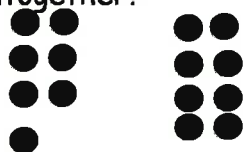
Children can begin to use these practically with a mat and concrete objects to count into the parts. The parts may be squared to show the exact amount in each part. They may place 25 in the left side, 24 in the right side and move them to the top altogether to count the total.

## Recording Addition Year 2

Year 2

### Pictures / Marks

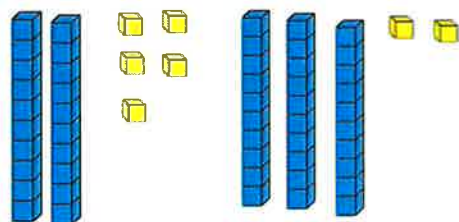
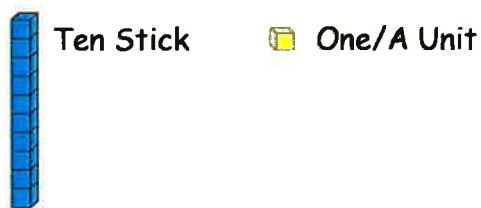
There are 7 people on the bus. 8 more get on. How many people are on the bus altogether?



Count them altogether - 15

### Dienes

Children practically use dienes to represent numbers and use them to carry out calculations. They represent the tens and the ones in each number and can be used to partition numbers as well as for calculations. They can also record these pictorially.



$$25 + 32 = 57$$

### Signs and symbols

$$5 + 4 = \underline{\quad}$$

$$\underline{\quad} = 5 + 4$$

$$5 + \underline{\quad} = 9$$

$$9 = \underline{\quad} + 4$$

$$\underline{\quad} + 4 = 9$$

$$9 = 5 + \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = 9$$

$$9 = \underline{\quad} + \underline{\quad} + \underline{\quad}$$

Adding three numbers  $1 + \underline{\quad} + 5 = 17$

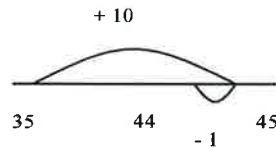
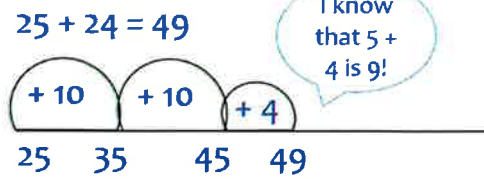
Extend to  $14 + 5 = 10 + \underline{\quad}$

Record a partitioned number as a number sentence e.g.  $53 = 40 + 13$  or  $30 + 23$

**Number lines** (partly numbered - empty number line)

$25 + 24$

(partition)



$35 + 9$

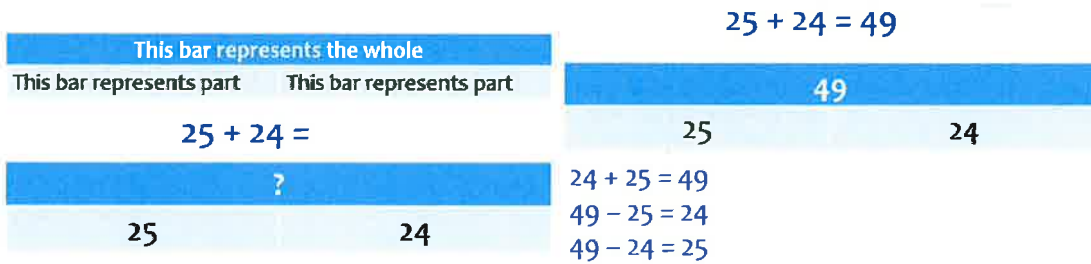
add 9 by adjusting (Add 10 and then take away 1)

**Bubble Strategy**

Partition the number into tens and ones (mentally or using dienes). Add the tens. Add the units. Add together.

$$\begin{array}{r} 50 + 20 = 70 \\ \textcircled{54} + \textcircled{21} = \textcircled{75} \\ 4 + 1 = 5 \end{array}$$

**Bar Model**



### Informal jottings

#### Partition into tens and ones and recombine

$$\begin{aligned} 23 + 12 &= 23 + 10 + 2 \\ &= 33 + 2 \\ &= 35 \end{aligned}$$

Partition  
the second  
number and  
add

$$3 + 8 + 7 = 10 + 8$$

$$10 + 8 = 18$$


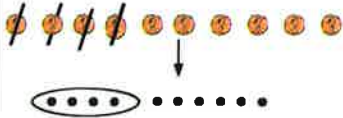
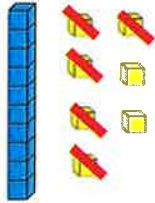
#### Pairs totalling ten

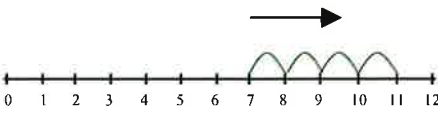
#### Explaining in words

*(Explaining methods and reasoning orally)*



**Recording Subtraction Reception and Year 1**

Foundation Stage	Year 1
<p><b><u>Pictures / marks</u></b></p> <p>We made 6 cakes and ate 2. How many are left?</p>  <p>Drawing out and drawing pictures from stories involving calculation</p>	<p><b><u>Pictures / marks</u></b></p> <p>Sam spent 4p. What was his change from 10p?</p> 
	<p><b><u>Dienes</u></b></p> <p>Children practically use dienes to represent numbers and use them to carry out calculations. They represent the tens and the ones in each number and can be used to partition numbers as well as for calculations. They can also record these pictorially.</p>  <p>17 - 5 = 12</p>
<p><b><u>Signs and symbols</u></b></p> <p><i>(Number sentences modelled by adults)</i></p>	<p><b><u>Signs and symbols</u></b></p> <p>5 - 2 = ____      ____ = 5 - 2</p> <p>5 - ____ = 3      3 = ____ - 2</p> <p>____ - 2 = 3      3 = 5 - ____</p> <p>____ - ____ = 3      3 = ____ - ____</p>

	<p>Children understand that the order of numbers in a subtraction calculation matters.</p>
<p><b><u>Number lines</u></b>  <i>(Prepared number tracks and lines used)</i></p>	<p><b><u>Number lines</u></b>          Example:- 11-7  <i>Counting back</i>      ←</p> <hr/> <p style="text-align: right;">7      11</p> <p><i>Counting on</i>  <i>the difference between 7 and 11</i></p> <p style="text-align: center;">→</p>  <p>0 1 2 3 4 5 6 7 8 9 10 11 12</p> <p>Recording by - drawing jumps on prepared lines</p> <ul style="list-style-type: none"> <li>- constructing own lines</li> </ul> <p>Finding the difference using cubes / materials / toys etc and recording as a number sentence</p>
<p><b><u>Informal jottings</u></b></p>	<p><b><u>Informal jottings</u></b>  <i>(Teachers model jottings appropriate for larger numbers)</i></p> <p>Use diagrams to solve problems involving subtraction</p>

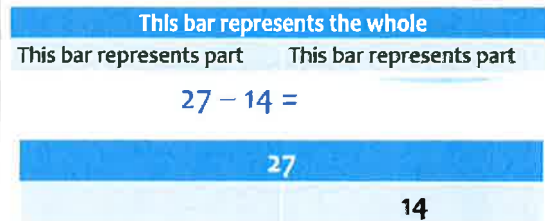
**Practical Examples**

- Finding one less than (numbers to 10)
- Picture/story boards of calculations
- Pose problems and questions related to everyday routines

**Practical Examples**

- Use of appropriate number lines / 100 squares to count back
- Using fingers to take some away
- Number rhymes with props
- How many beads are on a longer string than a shorter one?

**Bar Model**



Children can begin to use these practically with a mat and concrete objects to count into the parts. The parts may be squared to show the exact amount in each part. When taking away they would need to start with the total amount (27), move some down (14) and see how many are left (13).

## Recording Subtraction Year 2

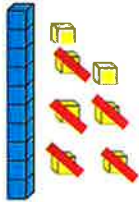
### Pictures / marks

There were 17 bean bags in a bucket.  
Luke took 9. How many are in the bucket?



### Dienes

Children practically use dienes to represent numbers and use them to carry out calculations. They represent the tens and the ones in each number and can be used to partition numbers as well as for calculations. They can also record these pictorially.



$$17 - 5 = 12$$

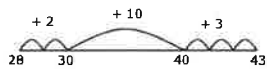
### Signs and symbols

$$\begin{array}{ll} 9 - 4 = \underline{\quad} & \underline{\quad} = 9 - 4 \\ 9 - \underline{\quad} = 5 & 5 = \underline{\quad} - 4 \\ \underline{\quad} - 4 = 5 & 5 = 9 - \underline{\quad} \\ \underline{\quad} - \underline{\quad} = 5 & 5 = \underline{\quad} - \underline{\quad} \end{array}$$

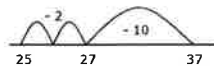
Extend to  $14 + 5 = 20 - \underline{\quad}$

### Number lines (partly numbered - empty)

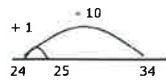
43-28  
count on



37 - 12  
partition



34 - 9  
subtract 9



64 - 25 - Count back 20, then 4, then 1 on a numberline

**Informal jottings**

$$\begin{aligned} 37 - 12 &= 37 - 10 - 2 && \text{Partition the second number} \\ 37 - 10 &= 27 \\ 27 - 2 &= 25 \end{aligned}$$

use jottings to solve problems involving subtraction

**Explaining in writing**

*(Explaining methods and reasoning orally)*

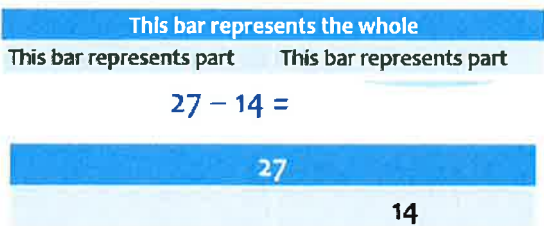
Children can find differences in practical situations  
Use of 100 square to support counting back in tens

**Bubble Strategy**

Partition the number into tens and ones (mentally or using dienes). Subtract the tens. Subtract the units. Add together. When the second unit is larger than the first unit (e.g. 52 - 35) this method cannot be used.



$$\begin{array}{r} 50 - 20 = 30 \\ \textcircled{54} - \textcircled{21} = \textcircled{33} \\ 4 - 1 = 3 \end{array}$$

**Bar Model**



Children can begin to use these practically with a mat and concrete objects to count into the parts. The parts may be squared to show the exact amount in each part. When taking away they would need to start with the total amount (27), move some down (14) and see how many are left (13).

## Recording Multiplication Foundation Stage and Year 1

Foundation Stage	Year 1
<p><b><u>Pictures / marks</u></b></p> <p>How many wheels do we need to make three lego cars?</p>  <p>Drawing objects that represent counting in 2s, 5s, 10s e.g. numicon 2, 2 pence pieces etc.</p>	<p><b><u>Pictures / marks</u></b></p> <p>There are 3 sweets in one bag.</p> <p>How many sweets are there in 5 bags?</p> 
<p><b><u>Signs and symbols</u></b></p> <p><i>(Number sentences modelled by adults - repeated addition and mutliplication)</i></p> <p><i>2 x 3 = 2, 3 times.</i></p>	<p><b><u>Signs and symbols</u></b></p> <p>5 x 2 = _____ x 2 = 10</p> <p>Read as 5, 2 times.</p> <p>2 x 5 = _____ x 5 = 25</p> <p>Read as 2, 5 times.</p> <p>10 x 2 = _____ x 10 = 50</p> <p>Read as 10, 2 times.</p>
<p><b><u>Number lines</u></b></p> <p>Children can move along a numberline</p> <p>Eg. Jumping forward along a number track in ones and twos and fives and tens</p>	<p><b><u>Number lines (numbered)</u></b></p> <p><i>(Recording on a number line modelled by the teacher when solving problems)</i></p> <p>Link counting in twos, fives and tens to jumping along a number line.</p>
<p><b><u>Informal jottings</u></b></p> <p>Draw groups of objects in sets</p>	<p><b><u>Informal jottings</u></b></p> <p>Identify missing numbers in number sentences, linked to counting in steps of different sizes</p>

### Practical Examples

- Pairs of socks in 2s on a washing line
- Counting in 2s, 5s and 10s
- Count repeated groups of the same size
- Sort real objects and pictures into sets of equal number, whilst counting aloud
- Show photos of hands on IWB. How can we arrange them to make counting the fingers easier?
- Role play opportunities... 'We'll need enough for 6 of us'
- Counting objects into arrays
- building numbers in different ways talking about the whole and part numbers

### Practical Examples

- Sort objects into groups to count and represent as a picture
- Investigating natural multiples by grouping, arranging and sorting...

Eggs in a box

Corners on squares

Fingers and gloves

- Children use practical equipment, such as 10ps or straws bundled in tens, to consolidate the count
- 'I have three pairs of socks in my basket. How many socks is this?'

### Arrays

Children can draw arrays to represent the groups in the multiplication.

What do you notice?

$5 \times 2 = 10$   
 $2 + 2 + 2 + 2 + 2 = 10$

$2 \times 5 = 10$   
 $5 + 5 = 10$

## Recording Multiplication

Year 2

### Pictures / marks

There are 4 apples in one box. How many apples in 6 boxes?

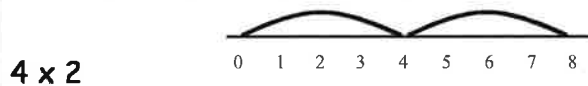
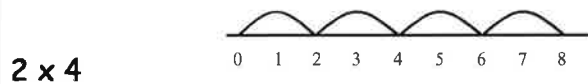


### Signs and symbols

$$\begin{array}{l} 2 \times 6 = \underline{\quad} \quad \quad \underline{\quad} = 2 \times 6 \\ \underline{\quad} \times 6 = 12 \quad \quad 12 = \underline{\quad} \times 6 \\ 2 \times \underline{\quad} = 12 \quad \quad 12 = \underline{\quad} \times 2 \\ \underline{\quad} \times \underline{\quad} = 12 \quad \quad 12 = \underline{\quad} \times \underline{\quad} \end{array}$$

Extend to  $5 \times 4 = 10 \times \underline{\quad}$

### Number lines (numbered then empty)



Recording by - drawing jumps on prepared line  
- constructing own lines

### Informal jottings

Arrays



Repeated addition  $2 \times 4 = 2 + 2 + 2 + 2$



Doubling by Partitioning  $15 \times 2 =$   $15 = 10 + 5$   
 $10 \times 2 = 20$  (Double 10)  $5 \times 2 = 10$  (Double 5)  
 $20 + 10 = 30$



### Practical Examples

- Chanting of tables is supported by counting stick or visual image of a number dial or number line
- Double amounts of money and match each coin with its 'identical twin'
- Use pegboards to create arrays, where rows and columns are in different colours

### Recording Division Foundation Stage and Year 1

Foundation Stage	Year 1
<p><b><u>Pictures / marks</u></b></p> <p>Grouping</p> <p>How many pairs of socks are there in the 'laundrette'?</p> 	<p><b><u>Pictures / marks</u></b></p> <p>12 children get into teams of 4 to play a game. How many teams are there?</p>  <p>Children record their solution by drawing</p>
<p><b><u>Signs and symbols</u></b></p> <p><i>(Number sentences modelled by the teacher)</i></p>	<p><b><u>Signs and symbols</u></b></p> <p><math>4 + 4 + 4 = 12</math></p> <p><math>12 \div 3 = 4</math></p>
<p><b><u>Informal jottings</u></b></p>	<p><b><u>Informal jottings</u></b></p> <p>Solve problems through drawing a diagram</p> <p>Eg. 15 children sit at 3 tables. How many children are at each table if there are the same number at each?</p>
<p><b><u>Practical Examples</u></b></p> <ul style="list-style-type: none"><li>• In the role play area share the place settings between 2 children</li><li>• Group bags of sweets for the teddies</li><li>• Follow a recipe:- each child will need 5 cherries</li></ul>	<p><b><u>Practical Examples</u></b></p> <ul style="list-style-type: none"><li>• Sharing resources between children</li><li>• Sharing mats</li><li>• Bar models</li><li>• Grouping objects</li></ul>

## Recording Division Foundation Year 2

Year 2

### Pictures / marks

4 eggs fit in a box.

How many boxes would you need to pack 20 eggs?



### Signs and symbols

$$12 \div 2 = \underline{\quad} \quad \underline{\quad} = 12 \div 2$$

$$12 \div \underline{\quad} = 6 \quad 6 = \underline{\quad} \div 2$$

$$\underline{\quad} \div 2 = 6 \quad 6 = 12 \div \underline{\quad}$$

$$\underline{\quad} \div \underline{\quad} = 6 \quad 6 = \underline{\quad} \div \underline{\quad}$$

Extend to 15 - 10 = 10  $\div$   $\underline{\quad}$

### Fraction Walls

Children can use a Fraction Wall (similar to a Bar Model) to share an amount/number.

The whole number/amount			
Half		Half	
Quarter	Quarter	Quarter	Quarter

Dividing by 2

Dividing by 4

The whole number/amount		
Third	Third	Third

Dividing by 3

**Informal jottings**

Arrays                      or

$$8 \div 2$$

Sharing  $10 \div 2$       Grouping  $10 \div 2$

Understand division as sharing and grouping

