



**Bedgrove Infant School**

## **Calculation Policy**

**Last reviewed and approved: Summer 2022**

**Next review date: Spring 2025**

## Calculation at Bedgrove Infant School

Written methods of calculation are based on mental strategies. Each of the four operations (addition, subtraction, multiplication and division) builds on mental skills such as number bonds which provide the foundations for jottings and informal written methods of recording. Calculation concepts need to be supported and therefore strategies progress from the use of concrete resources such as cubes through to pictorial or visual representations and jottings and finally to the use of the abstract or number sentences. Building the children's experience of calculation in this way helps to develop their understanding of the different mathematical concepts and how they relate to each other rather than them just being able to apply a strategy to calculate an answer.

Within the new curriculum, mental Maths skills and the knowledge of number facts are important skills that need to be taught, practised and reviewed constantly in order to support children with their calculations regardless of format.

When learning a new strategy, it is important that children start with numbers they can easily manipulate so that they can understand the concept. It is also important to teach the new method alongside the one the child is already familiar with so that they may see the link between the two methods.

The transition between the strategies detailed in this policy is a guideline and dependent on the development of individual children since not all will be ready to move on to the next stage at the same time.

### **Useful Maths Websites:**


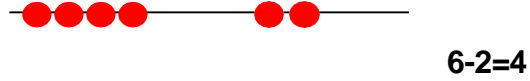
[CPD Training | Free maths resources | White Rose Maths](#)






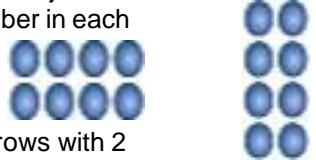
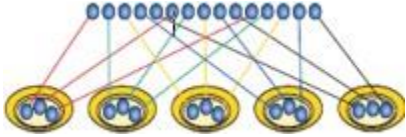
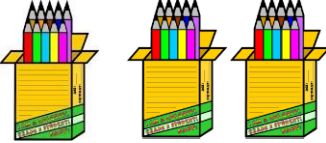
[www.topmarks.co.uk](http://www.topmarks.co.uk)

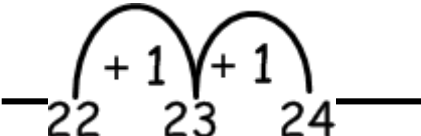
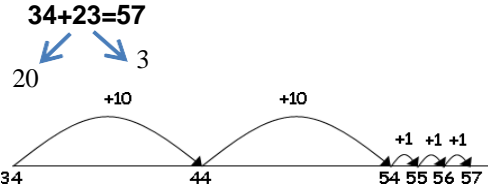
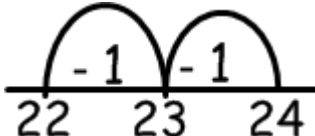
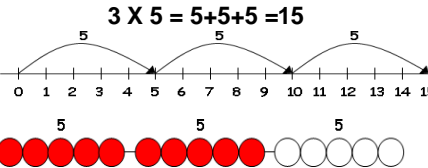
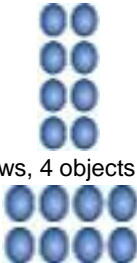
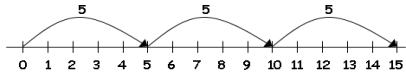
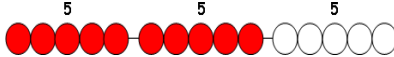
<http://www.primarygames.co.uk/>

<http://www.ictgames.com/resources.html>

<http://www.oxfordowl.co.uk/maths/>

	Addition	Subtraction	Multiplication	Division
<b>Reception</b>	<p><b><u>Objects</u></b> Using quantities and objects, they add two single-digit numbers within 20</p> <p><b><u>Bead Strings (or similar)</u></b> Bead strings can be used to illustrate the concept of addition. Further explore the idea of commutativity i.e. numbers can be added in any order.</p>  <p><b><u>Number-lines/tracks</u></b> Teachers <i>demonstrate</i> the use of the number-line. They use number tracks and practical resources to support calculation and count on to find the answer.</p> <p><b><u>Recording</u></b> Records, using marks that they can interpret and explain.</p> <p><b><u>Tens Frame</u></b> Used to show various ways of adding with a strong visual interpretation</p> <p><b><u>Part Whole Model</u></b> To explore addition visually so that they can see the link between the numbers in a number sentence</p>	<p><b><u>Objects</u></b> Using quantities and objects, they subtract two single-digit numbers within 20</p> <p><b><u>Bead Strings (or similar)</u></b> Bead strings can be used to illustrate subtraction including bridging through ten.</p>  <p><b><u>Number-lines/tracks</u></b> Teachers <i>demonstrate</i> the use of the number-line. They use number tracks and practical resources to support calculation, and count back to find the answer.</p> <p><b><u>Recording</u></b> Records, using marks that they can interpret and explain.</p> <p><b><u>Tens Frame</u></b> Used to show various ways of adding with a strong visual interpretation</p>	<p><b><u>Grouping and counting</u></b> Children will use practical resources to make equal groups then count to find the total in role-play and problem solving activities</p> <p><b><u>Patterns in numbers</u></b> Looking at 2s, 5s and 10s through songs and rhymes. Hundred square is used to show the patterns of multiplication.</p>	<p><b><u>Halving and Sharing</u></b> Children will use practical resources to make equal groups and share items out in role-play and problem solving activities</p> <p><b><u>Halving Mat/ Part Whole</u></b> Visual practical ways to introduce halving and sharing for division. Introduction of the divide symbol.</p>

	Addition	Subtraction	Multiplication	Division				
Y1	<p>Ensure children are secure with apparatus e.g. using cubes then moving onto methods such as:</p> <p><b>Number Lines</b> Teachers initially <i>demonstrate</i> the use of the number-line, and then children can use 0-20 and 0-30 number-lines and practical resources to support their own calculation when counting forwards in ones.</p> <p>9 and 1 more is 10 9 add 1 equals 10 <math>9 + 1 = 10</math></p>  <p><b>Bead strings/Dienes (or similar)</b> Used to illustrate addition including <b>bridging through ten (crossing ten)</b>. e.g. to calculate <math>8+5=</math> ___ counting on 2 to 10 and before counting on another 3.</p>  <p><b>100 Squares</b> Demonstrate working out the answer to number sentences that involve larger numbers using 100 squares to model counting forwards. Children use this to support their own calculations by circling the start number and counting on.</p> <p><b>Number Bonds</b> Practise rapid recall of number bonds within 5, 10 and 20 to support calculation methods.</p> <p><b>Part Whole Model</b> To explore addition visually so that they can see the link between the numbers in a number sentence.</p>	<p>Ensure children are secure with apparatus e.g. using cubes then moving onto methods such as:</p> <p><b>Number Lines</b> Teachers initially <i>demonstrate</i> the use of the number-line, and then children can use 0-20 and 0-30 number-lines and practical resources to support their own calculation when counting back in ones.</p> <p><b>Bead strings/Dienes (or similar)</b> Used to illustrate subtraction including <b>bridging through ten (crossing 10)</b> e.g. to calculate <math>13 - 5 =</math> ___</p>  <p><b>100 Square</b> Demonstrate working out the answer to number sentences that involve larger numbers using 100 square to model counting backwards. Children use this to support their own calculations by circling the start number and counting back.</p> <p><b>Difference</b> Use concrete apparatus e.g. cubes so children can see difference between 2 numbers.</p>  <p>The term difference should be used practically, in the context of measuring.</p>	<p>Introduce children to concept by using methods such as:</p> <p><b>Counting</b> They will count in 1s, 2s, 5s and 10s. Children are introduced to the concept that by doing this, they are adding 1, 2, 5 and 10 each time. Children begin to count real objects or pictures of objects using the language of groups of, lots of and sets of. e.g. 3 lots of crayons, 10 in each lot or 3 groups of crayons, 10 in each group.</p>  <p>10, 20 30</p> <p><b>Grouping</b> Children will experience making equal groups of objects in order to count them.</p> <p><b>Using groups to solve problems</b> They will work on practical problem solving activities involving equal sets or groups.</p> <p><b>Arrays</b> Children should be able to model a multiplication calculation using an array. Initially this is modelled as the 1<sup>st</sup> number indicating the number of rows (or groups) and the 2<sup>nd</sup> number the number of objects in each row (the number in each group).</p>  <p>so <math>4 \times 2 = 4</math> rows with 2 objects in each row but <math>2 \times 4 = 2</math> rows, 4 objects each row.</p>	<p>Ensure children are secure with methods such as:</p> <p><b>Grouping and sharing</b> Children will understand how to make equal groups and share items out in role play and problem solving.</p> <p>15 shared between 5</p>  <p>30 pencils put into groups of 10</p>  <p><b>Bar Models</b> Use a pictorial representation to show and work out equal groups, sharing items. Children should understand this as sharing out the 10 crosses between the 2 groups.</p> <p><math>10 \div 2 =</math></p> <table border="1" data-bbox="1792 1157 2128 1236"> <tr> <td colspan="2" style="text-align: center;">10</td> </tr> <tr> <td style="border: 2px solid red;">X X X X X</td> <td>X X X X X</td> </tr> </table>	10		X X X X X	X X X X X
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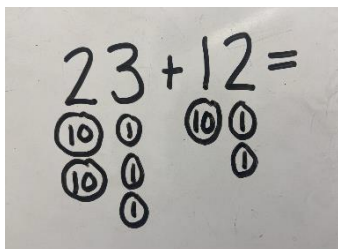
	Addition	Subtraction	Multiplication	Division
Y2	<p>Continue to ensure children are secure with Year 1 methods continuing to use some such as numbered number lines then:</p> <p><b>100 Squares</b> Children use 100 squares to help with the addition such as adding 10 and multiples of 10 to any number in order to see the pattern in the numbers, i.e. the tens digit changes but the ones do not.</p> <p><b>Concrete resources such as diennes</b> Children use concrete resources to illustrate place value and the addition of tens to any number and when beginning to add two 2 digit numbers.</p> <p><b>Empty Number Lines</b> Children will begin to use empty number lines to support their own calculations. First adding a single digit number: e.g. <math>22 + 2 = 24</math></p>  <p>Then moving to add two 2 digit numbers by partitioning the second number and adding the tens and then the ones. Place value will need to be secure for partitioning. eg. <math>34 + 23 = 57</math></p> 	<p>Continue to ensure children are secure with Year 1 methods continuing to use some such as number trails then:</p> <p><b>Numbered Number Lines</b> Children should continue to become secure with using 0-20 and 0-30 number lines to support mental methods of subtraction.</p> <p><b>100 Squares</b> Children use 100 squares to help with the subtraction of 10 and multiples of 10 from any number in order to see patterns in how the number changes.</p> <p><b>Empty Number Lines</b> Children will then begin to use empty number lines to support their own calculations. e.g. <math>24 - 2 = 22</math></p>  <p>Then moving to subtract a 2-digit number from another 2-digit number by partitioning the second number then subtracting the tens and then the ones (units). Place value will need to be secure for partitioning.</p>	<p>Continue to ensure children are secure with concept through counting then:</p> <p><b>Counting</b> They will continue to count in 1s, 2s, 5s and 10s moving on to counting in 3s.</p> <p><b>Repeated addition</b> 3 times 5 is <math>5 + 5 + 5 = 15</math> i.e. 3 lots of 5, or three 5's. Repeated addition can be shown easily on a number line or bead string:</p>  <p><b>Arrays</b> Children should be able to model a multiplication calculation using an array. Initially this is modelled as the 1<sup>st</sup> number indicating the number of rows (or groups) and the 2<sup>nd</sup> number the number of objects in each row (the number in each group). so <math>4 \times 2 = 4</math> rows with 2 objects in each row</p>  <p>but <math>2 \times 4 = 2</math> rows, 4 objects each row.</p>	<p>Continue to ensure children are secure with Year 1 methods and then:</p> <p>Children will develop their understanding of division and use jottings to support calculation.</p> <p><b>Grouping</b> Children should understand division as making groups of a number. So they can work out e.g. <math>15 \div 5</math> by counting out cubes and putting them into groups of 5. Model this using a blank counting stick when counting in 2s, 5s, and 10s.</p> <p><b>Division on a number line</b> <math>15 \div 5 = 3</math></p>  <p>Children should understand this number sentence as 'How many groups of 5 make 15?'</p> <p>And on a bead string:</p>  <p>By relating division to groups/grouping children can see the relationship between division and grouping: <math>15 \div 5 = 3</math> so <math>3 \times 5 = 15</math> and both would look the same on a number line.</p>

## Addition

Y2

### 10s and 1s Circles

In Spring moving on to using partitioning skills to separate the tens and ones, drawing the 10s circles and 1s circles under each digit and then adding them up starting with counting all of the 10s circles.



### Number Facts

All these methods can be accessed and applied more readily if children are able to rapidly recall number facts to at least 10.

In addition, if children know:

e.g.  $2 + 3 = 5$

then they can also easily work out:

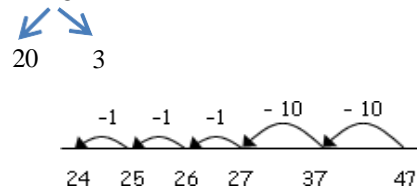
$20 + 30 = 50$

$22 + 33 = 55$

$32 + 23 = 55$  etc.

## Subtraction

$47 - 23 = 24$



### Difference

The vocabulary of difference should continue to be used in a practical context and then shown that it is the same as subtraction.

Number lines can be used to show subtraction and difference are the same and can be done by counting up or back between 2 numbers on a number line.

### Number Facts

All these methods can be accessed and applied more readily if children are able to rapidly recall number facts to at least 10.

In subtraction if children know:

e.g.  $3 - 2 = 1$

then they can also easily work out:

$30 - 20 = 10$

$33 - 22 = 11$

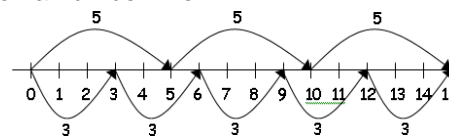
$32 - 20 = 12$  etc.

## Multiplication

### Commutativity

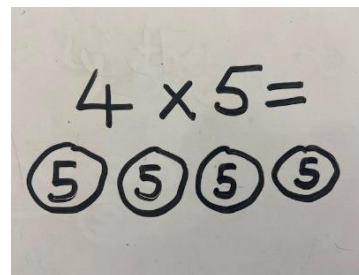
As children develop their understanding they realise that  $4 \times 2$  and  $2 \times 4$  have the same answer and so one array demonstrates both.

They understand that e.g.  $5 \times 3$  has the same answer as  $3 \times 5$  which makes counting easier and can demonstrate both on a number line.



### Multiplication Plates

Considering commutativity, understanding that you can pick the hardest number to count up in to show you how many circles to draw and write the easier number to count up in, inside each circle. You can then count up in the appropriate times tables (2s, 5s, 10s and 3s)



## Division

### Bar Models

Use a pictorial representation to show and work out equal groups, sharing items. Children should understand this as sharing out the 10 crosses between the 2 groups.

$10 \div 2 =$

