

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 and 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:

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

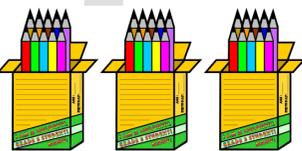
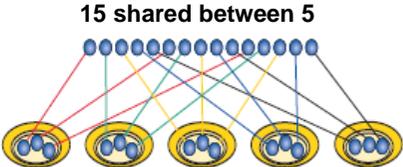
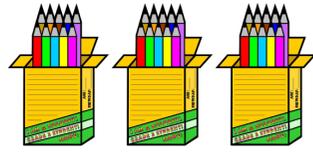
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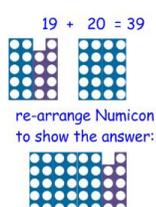
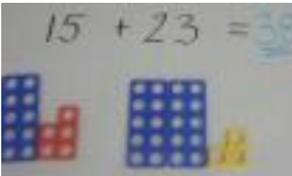
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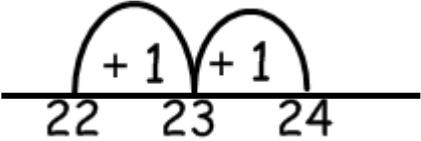
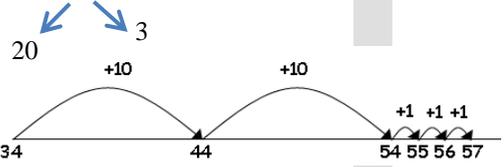
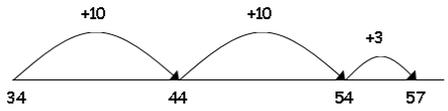
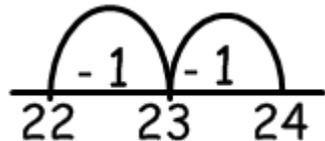
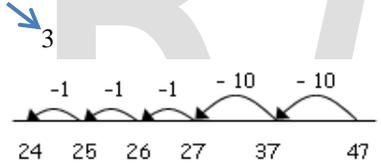
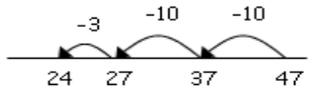
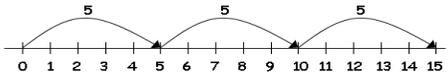
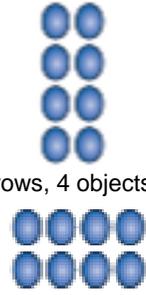
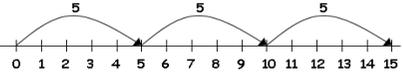
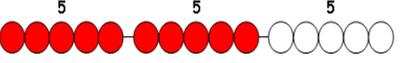
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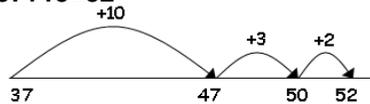
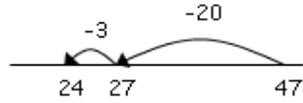
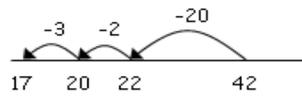
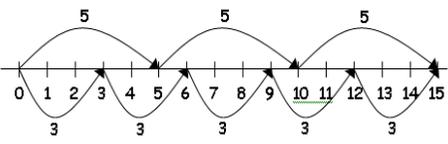
<http://www.multiplication.com/>

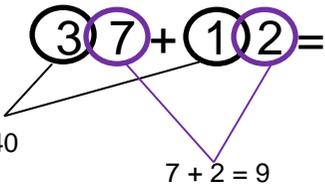
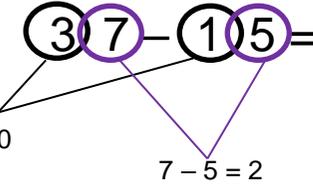
	Addition	Subtraction	Multiplication	Division
Reception	<p><u>Objects</u> Using quantities and objects, they add two single-digit numbers within 20</p> <p><u>Bead Strings (or similar)</u> Bead strings can be used to illustrate the concept of addition. Further explore the idea of commutativity i.e, numbers can be added in any order.</p>  <p style="text-align: right;">$8+2=10$</p> <p><u>Number-lines/tracks</u> 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><u>Recording</u> Records, using marks that they can interpret and explain.</p>	<p><u>Objects</u> Using quantities and objects, they subtract two single-digit numbers within 20</p> <p><u>Bead Strings (or similar)</u> Bead strings can be used to illustrate subtraction including bridging through ten by counting back 3 then counting back 2.</p>  <p style="text-align: right;">$6-2=4$</p> <p><u>Number-lines/tracks</u> 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><u>Recording</u> Records, using marks that they can interpret and explain.</p>	<p><u>Grouping and counting</u> Children will use practical resources to make equal groups then count to find the total in role-play and problem solving activities</p>	<p><u>Halving and Sharing</u> Children will use practical resources to make equal groups and share items out in role-play and problem solving activities</p>

	Addition	Subtraction	Multiplication	Division
Y1	<p>Ensure children are secure with apparatus eg. using cubes then moving onto methods such as:</p> <p>Numbered Number Lines</p> <p>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 $9 + 1 = 10$</p>  <p>Bead strings (or similar)</p> <p>Used to illustrate addition including <i>bridging through ten (crossing ten)</i>. eg. to calculate $8 + 5 = \underline{\quad}$ counting on 2 to 10 and before counting on another 3.</p>  <p>100 trails</p> <p>Demonstrate working out the answer to number sentences that involve larger numbers using 100 trail to model counting forwards. Children use this to support their own calculations by circling the start number and counting on.</p> <p>Number Bonds</p> <p>Practise rapid recall of number bonds within 5, 10 and 20 to support calculation methods.</p>	<p>Ensure children are secure with apparatus eg. using cubes then moving onto methods such as:</p> <p>Numbered Number Lines</p> <p>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>Bead strings (or similar)</p> <p>Used to illustrate subtraction including <i>bridging through ten (crossing 10)</i> eg. to calculate $13 - 5 = \underline{\quad}$ counting back 3 to 10, before counting back another 2.</p>  <p>100 trails</p> <p>Demonstrate working out the answer to number sentences that involve larger numbers using 100 trails to model counting backwards. Children use this to support their own calculations by circling the start number and counting back.</p> <p>Difference</p> <p>Use concrete apparatus eg. cubes so children can see difference between 2 numbers.</p>  <div data-bbox="1019 1181 1232 1300" style="border: 1px solid black; padding: 5px;"> <p>The difference between our weights is 8kg.</p> </div> <p>The term difference should be used practically, in the context of measuring.</p> <div data-bbox="728 1372 1120 1484" style="border: 1px solid black; padding: 5px;"> <p>The difference between 11 and 14 is 3.</p> </div>	<p>Introduce children to concept by using methods such as:</p> <p>Counting</p> <p>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. eg. 3 lots of crayons, 10 in each lot or 3 groups of crayons, 10 in each group.</p>  <p>10, 20 30</p> <p>Grouping</p> <p>Children will experience making equal groups of objects in order to count them.</p> <p>Using groups to solve problems</p> <p>They will work on practical problem solving activities involving equal sets or groups.</p>	<p>Ensure children are secure with methods such as:</p> <p>Grouping and sharing</p> <p>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> 

	Addition	Subtraction	Multiplication	Division
Y2	<p>Continue to ensure children are secure with Year 1 methods continuing to use some such as number trails then:</p> <p><u>Numbered Number Lines</u> Children should continue to become secure with using 0-20 and 0-30 number lines, to support mental methods of addition. Children should understand that addition can be done in any order although it is more efficient to start with the largest number.</p> <p><u>100 Squares</u> Children use 100 squares to help with the addition of 10 and multiples of 10 to any number in order to see the pattern in the numbers, ie. the tens digit changes but the ones (units) do not).</p> <p><u>Concrete resources such as Numicon and Diennes:</u> 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>Continue to ensure children are secure with Year 1 methods continuing to use some such as number trails then.</p> <p><u>Numbered Number Lines</u> Children should continue to become secure with using 0-20 and 0-30 number lines to support mental methods of subtraction.</p> <p><u>100 Squares</u> 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><u>Concrete resources such as Numicon and Diennes:</u> Children may use concrete resources to illustrate the subtraction of tens from any number and when beginning to subtract one two 2 digit number from another.</p> $36 - 25 = 21$ 		

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Y2	<p>Empty Number Lines Children will begin to use empty number lines to support their own calculations. First adding a single digit number: eg. $22 + 2 = 24$</p>  <p>Then moving to add two 2 digit numbers by partitioning the second number and adding the tens and then the ones (units). Place value will need to be secure for partitioning. eg. $34 + 23 = 57$</p>  <p>Later becoming more efficient by adding the units in one jump (by using the known fact $4 + 3 = 7$). $34 + 23 = 57$</p> 	<p>Empty Number Lines Children will then begin to use empty number lines to support their own calculations. eg. $24 - 2 = 22$</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. $47 - 23 = 24$</p>  <p>Then becoming more efficient by subtracting the ones (units) in one jump by using the known fact $7 - 3 = 4$.</p> 	<p>Continue to ensure children are secure with concept through counting then: Counting They will continue to count in 1s, 2s, 5s and 10s moving on to counting in 3s.</p> <p>Repeated addition 3 times 5 is $5 + 5 + 5 = 15$ ie. 3 lots of 5, or three 5's. Repeated addition can be shown easily on a number line or bead string:</p> <p>$3 \times 5 = 5 + 5 + 5 = 15$</p>   <p>Arrays Children should be able to model a multiplication calculation using an array. Initially this is modelled as the 1st number indicating the number of rows (or groups) and the 2nd number the number of objects in each row (the number in each group). so $4 \times 2 = 4$ rows with 2 objects in each row</p>  <p>but $2 \times 4 = 2$ 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>Grouping Children should understand division as making groups of a number. So they can work out eg. $15 \div 5$ 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>Division on a number line</p> <p>$15 \div 5 = 3$</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: $15 \div 5 = 3$ so $3 \times 5 = 15$ and both would look the same on a number line.</p>

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Y2	<p>Eventually adding the tens in one jump and the ones (units) in one jump.</p> <p>34+23=57</p>  <p>Bridging through ten (breaking single number into smaller amounts to jump to next ten) can help children become more efficient.</p> <p>37+15=52</p>  <p>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: eg. $2 + 3 = 5$ then they can also easily work out: $20 + 30 = 50$ $22 + 33 = 55$ $32 + 23 = 55$ etc.</p>	<p>Eventually subtracting the tens in one jump and the ones (units) in one jump.</p>  <p>47-23=24</p> <p>Bridging through ten can help children become more efficient.</p>  <p>42-25=17</p> <p>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.</p> <p>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: eg. $3 - 2 = 1$ then they can also easily work out: $30 - 20 = 10$ $33 - 22 = 11$ $32 - 20 = 12$ etc.</p>	<p>Commutativity As children develop their understanding they realise that 4×2 and 2×4 have the same answer and so one array demonstrates both. They understand that eg. 5×3 has the same answer as 3×5 which makes counting easier and can demonstrate both on a number line.</p> 	

	Addition	Subtraction	Multiplication	Division
Y2	<p>During the summer term and if children have sufficient understanding they will be introduced to the idea of partitioning and to add which leads into the initial stages of column addition ready for transition to Yr3.</p> <p>Partitioning Children will also learn to partition 2 digit numbers into tens and ones before adding.</p>  <p>30 + 10 = 40 so 40 + 9 = 49</p> <p>or</p> <p>37 + 12 = 30 + 10 + 7 + 2 = 40 + 9 = 49</p> <p>If they have the depth of understanding:</p> $\begin{array}{r} 30 + 7 \\ 10 + 2 \\ \hline 40 + 9 = 49 \end{array}$ <p>They need to understand that if the ones add to more than 10 they need to take that into account in the last step.</p> <p>37 + 15 =</p> $\begin{array}{r} 30 + 7 \\ 10 + 5 \\ \hline 40 + 12 = 40 + 10 + 2 = 52 \end{array}$	<p>During the summer term and if children have sufficient understanding they will be introduced to the idea of partitioning and to add which leads into the initial stages of column subtraction ready for transition to Yr3.</p> <p>Partitioning Children may also learn to partition 2 digit numbers into tens and ones before subtracting but this only works if the ones in the first number are larger than in the number being subtracted to avoid bridging ten.</p>  <p>30 - 10 = 20 then add tens and ones: 20 + 2 = 22</p> <p>or if they have the depth of understanding:</p> $\begin{array}{r} 30 + 7 \\ - 10 + 5 \\ \hline 20 + 2 = 22 \end{array}$ <p>This method becomes much more complex if the start number has fewer ones than the number being subtracted therefore using a number line is more straight forward.</p>		