



Peacehaven Heights Primary School Calculation Policy

2019

At Peacehaven Heights Primary School, we have committed to the Mathematics Mastery principles and adhere to the Mathematics Mastery Progression in Calculations Policy. In addition to this we have created guidance on the progression of Mathematics throughout the school from EYFS to Year 6 involving all four operations.

The national curriculum for mathematics aims to ensure that all pupils:

become fluent in the fundamentals of mathematics, through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately

reason mathematically following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language

can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.



Therefore the **aims** of this Calculation policy are:

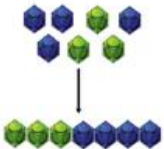
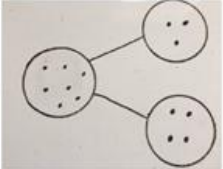
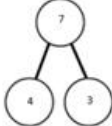
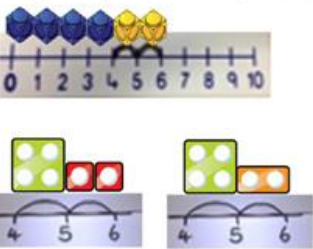
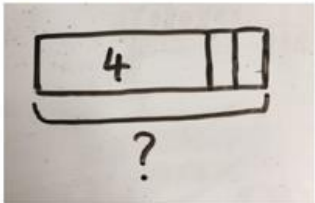
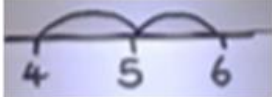

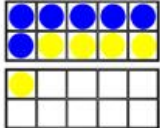
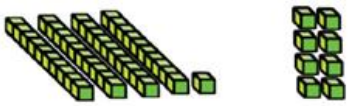
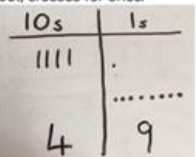
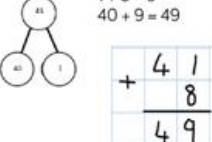
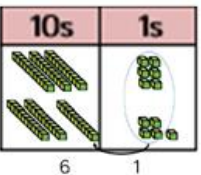
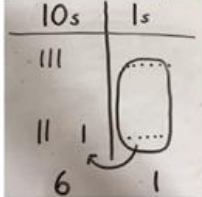
1. To ensure consistency and progression of calculation in all four operations
2. To support progression through using concrete, pictorial and abstract representations of all four operations
3. To ensure children develop formal written methods to apply to calculations involving all four operations
4. To enhance and strengthen children's mental maths progression

Fluency is key and therefore our aim is for children to be able to recall all single digit addition facts as quickly as they can tell you their name. By the end of Year 4 your child is expected to know their times tables. These multiplication facts should be hardwired just like the addition facts and will now be assessed at the end of Year 4.

Addition

EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Combining two parts to make a whole: part whole model.</p> <p>Starting at the bigger number and counting on- using cubes.</p> <p>Regrouping to make 10 using ten frame.</p>	<p>Adding three single digits.</p> <p>Use of base 10 to combine two numbers.</p>	<p>Column method- regrouping.</p> <p>Using place value counters (up to 3 digits).</p>	<p>Column method- regrouping. (up to 4 digits)</p>	<p>Column method- regrouping.</p> <p>Use of place value counters for adding decimals.</p>	<p>Column method- regrouping.</p> <p>Abstract methods.</p> <p>Place value counters to be used for adding decimal numbers.</p>

Addition

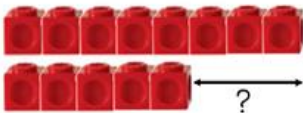
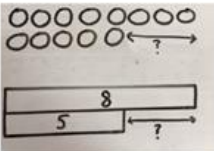
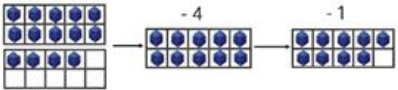
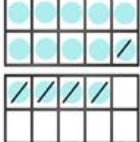
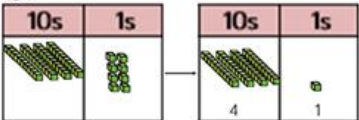
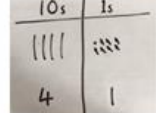
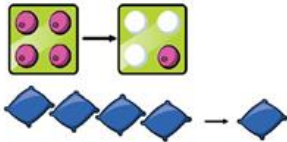
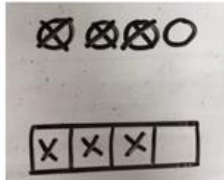
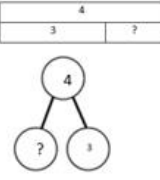

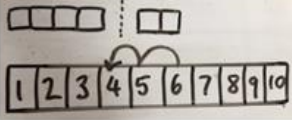
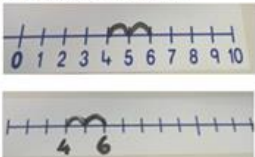
Concrete	Pictorial	Abstract
<p>Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars).</p> 	<p>Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.</p> 	<p>$4 + 3 = 7$ Four is a part, 3 is a part and the whole is seven.</p> 
<p>Counting on using number lines using cubes or Numicon.</p> 	<p>A bar model which encourages the children to count on, rather than count all.</p> 	<p>The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? $4 + 2$</p> 
<p>Regrouping to make 10; using ten frames and counters/cubes or using Numicon.</p> <p>$6 + 5$</p> 	<p>Children to draw the ten frame and counters/cubes.</p> 	<p>Children to develop an understanding of equality e.g.</p> <p>$6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$</p>
<p>TO + O using base 10. Continue to develop understanding of partitioning and place value.</p> <p>$41 + 8$</p> 	<p>Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.</p> 	<p>$41 + 8$</p> <p>$1 + 8 = 9$ $40 + 9 = 49$</p> 
<p>TO + TO using base 10. Continue to develop understanding of partitioning and place value.</p> <p>$36 + 25$</p> 	<p>Children to represent the base 10 in a place value chart.</p> 	<p>Looking for ways to make 10.</p> <p>$36 + 25 =$ $30 + 20 = 50$ $5 + 5 = 10$ $50 + 10 + 1 = 61$</p> <p>1 5 36</p> <p>Formal method:</p> $\begin{array}{r} +25 \\ 36 \\ \hline 61 \\ \hline \end{array}$



Subtraction

EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Taking away ones Counting back Find the difference Part whole model Make 10 using the ten frame	Counting back Find the difference Part whole model Make 10 Use of base 10	Column method with regrouping. (up to 3 digits using place value counters)	Column method with regrouping. (up to 4 digits)	Column method with regrouping. Abstract for whole numbers. Start with place value counters for decimals with the same amount of decimal places.	Column method with regrouping. Abstract methods. Place value counters for decimals with different amounts of decimal places.


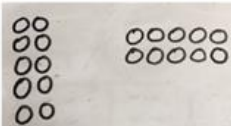
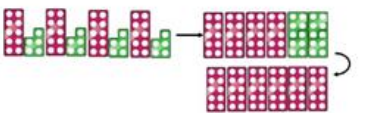
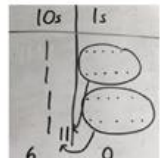
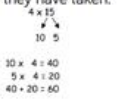
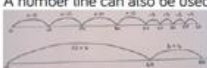
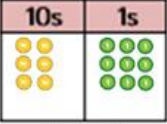
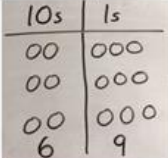

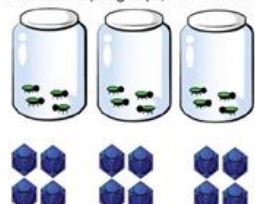
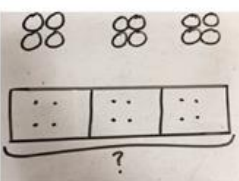
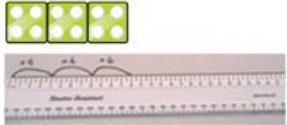
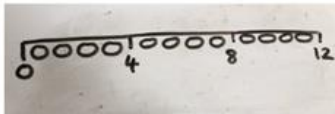

Subtraction

Concrete	Pictorial	Abstract
<p>Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used).</p> <p>Calculate the difference between 8 and 5.</p> 	<p>Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.</p> 	<p>Find the difference between 8 and 5.</p> <p>8 - 5, the difference is <input type="text"/></p> <p>Children to explore why $9 - 6 = 8 - 5 = 7 - 4$ have the same difference.</p>
<p>Making 10 using ten frames.</p> <p>14 - 5</p> 	<p>Children to present the ten frame pictorially and discuss what they did to make 10.</p> 	<p>Children to show how they can make 10 by partitioning the subtrahend.</p> $14 - 5 = 9$ $\begin{array}{r} 4 \\ 1 \end{array}$ $14 - 4 = 10$ $10 - 1 = 9$
<p>Column method using base 10.</p> <p>48 - 7</p> 	<p>Children to represent the base 10 pictorially.</p> 	<p>Column method or children could count back 7.</p> $\begin{array}{r} 48 \\ - 7 \\ \hline 41 \end{array}$
<p>Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used).</p> <p>4 - 3 = 1</p> 	<p>Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used.</p> 	<p>4 - 3 =</p> $\begin{array}{r} 4 \\ - 3 \\ \hline 1 \end{array}$ 
<p>Counting back (using number lines or number tracks) children start with 6 and count back 2.</p> <p>6 - 2 = 4</p> 	<p>Children to represent what they see pictorially e.g.</p> 	<p>Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line</p> 

Multiplication

EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Recognising and making equal groups.</p> <p>Doubling</p> <p>Counting in multiples</p> <p>Use cubes, Numicon and other objects in the classroom</p>	<p>Arrays- showing commutative multiplication</p>	<p>Arrays $2d \times 1d$ using base 10</p>	<p>Column multiplication- introduced with place value counters. (2 and 3 digit multiplied by 1 digit)</p>	<p>Column multiplication Abstract only but might need a repeat of year 4 first (up to 4 digit numbers multiplied by 1 or 2 digits)</p>	<p>Column multiplication Abstract methods (multi-digit up to 4 digits by a 2 digit number)</p>

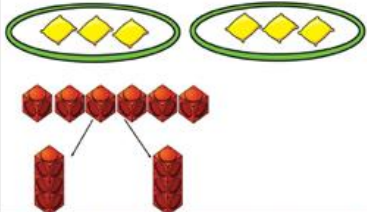
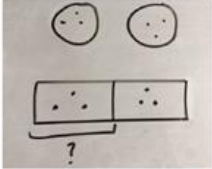
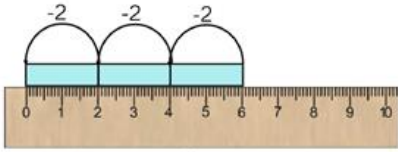
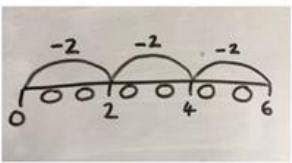
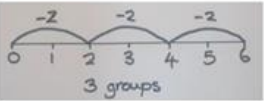

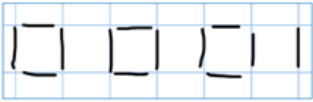

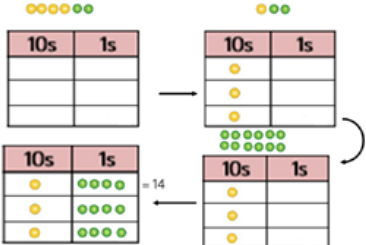
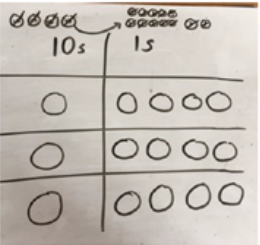
Multiplication

Concrete	Pictorial	Abstract
<p>Use arrays to illustrate commutativity counters and other objects can also be used. $2 \times 5 = 5 \times 2$</p>  <p>2 lots of 5 5 lots of 2</p>	<p>Children to represent the arrays pictorially.</p> 	<p>Children to be able to use an array to write a range of calculations e.g.</p> <p> $10 = 2 \times 5$ $5 \times 2 = 10$ $2 + 2 + 2 + 2 + 2 = 10$ $10 = 5 + 5$ </p>
<p>Partition to multiply using Numicon, base 10 or Cuisenaire rods. 4×15</p> 	<p>Children to represent the concrete manipulatives pictorially.</p> 	<p>Children to be encouraged to show the steps they have taken.</p>  <p>A number line can also be used</p> 
<p>Formal column method with place value counters (base 10 can also be used.) 3×23</p> 	<p>Children to represent the counters pictorially.</p> 	<p>Children to record what it is they are doing to show understanding.</p> <p> 3×23 $3 \times 20 = 60$ $3 \times 3 = 9$ $60 + 9 = 69$ </p> 
<p>Repeated grouping/repeated addition 3×4 $4 + 4 + 4$ There are 3 equal groups, with 4 in each group.</p> 	<p>Children to represent the practical resources in a picture and use a bar model.</p> 	<p> $3 \times 4 = 12$ $4 + 4 + 4 = 12$ </p>
<p>Number lines to show repeated groups- 3×4</p>  <p>Cuisenaire rods can be used too.</p>	<p>Represent this pictorially alongside a number line e.g.:</p> 	<p>Abstract number line showing three jumps of four.</p> <p>$3 \times 4 = 12$</p> 

Division

EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Sharing objects into groups</p> <p>Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups?</p> <p>Use cubes and draw round 3 cubes at a time.</p>	<p>Division as grouping</p> <p>Division within arrays- linking to multiplication</p> <p>Repeated subtraction</p>	<p>Division with a remainder- using lollipop sticks, times tables facts and repeated subtraction.</p> <p>2d divided by 1d using base 10 or place value counters</p>	<p>Division with a remainder</p> <p>Short division (up to 3 digits by 1 digit- concrete and pictorial)</p>	<p>Short division (up to 4 digits by a 1 digit number including remainders)</p>	<p>Short division</p> <p>Long division with place value counters (up to 4 digits by a 2 digit number)</p> <p>Children should exchange into the tenths and hundredths column too</p>

Division

Concrete	Pictorial	Abstract		
<p>Sharing using a range of objects. $6 \div 2$</p> 	<p>Represent the sharing pictorially.</p> 	<p>$6 \div 2 = 3$</p> <table border="1" data-bbox="1061 409 1300 454"> <tr> <td>3</td> <td>3</td> </tr> </table> <p>Children should also be encouraged to use their 2 times tables facts.</p>	3	3
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<p>Repeated subtraction using Cuisenaire rods above a ruler. $6 \div 2$</p>  <p>3 groups of 2</p>	<p>Children to represent repeated subtraction pictorially.</p> 	<p>Abstract number line to represent the equal groups that have been subtracted.</p> 		
<p>$2d + 1d$ with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used. $13 \div 4$</p> <p>Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.</p>  <p>There are 3 whole squares, with 1 left over.</p>	<p>Children to represent the lollipop sticks pictorially.</p>  <p>There are 3 whole squares, with 1 left over.</p>	<p>$13 \div 4 = 3$ remainder 1</p> <p>Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line.</p> <p>'3 groups of 4, with 1 left over'</p> 		
<p>Sharing using place value counters. $42 \div 3 = 14$</p> 	<p>Children to represent the place value counters pictorially.</p> 	<p>Children to be able to make sense of the place value counters and write calculations to show the process.</p> <p>$42 \div 3$ $42 = 30 + 12$ $30 \div 3 = 10$ $12 \div 3 = 4$ $10 + 4 = 14$</p>		