

Draft Policy  
Progression in Calculation  
September 2008

## **Aims**

Children are introduced to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas they develop ways of recording to support their thinking and calculation methods and learn to interpret and use the signs and symbols involved. Over time children learn how to use models and images, such as empty number lines, to support their mental and informal written methods of calculation. As children's mental methods are strengthened and refined, so too are their informal written methods. These methods become more efficient and succinct and lead to efficient written methods that can be used more generally. By the end of Year 6 children are equipped with mental, written and calculator methods that they understand and can use correctly. When faced with a calculation, children are able to decide which method is most appropriate and have strategies to check its accuracy. At whatever stage in their learning, and whatever method is being used, it must still be underpinned by a secure and appropriate knowledge of number facts, along with those mental skills that are needed to carry out the process and judge if it was successful.

### **Developed by:**

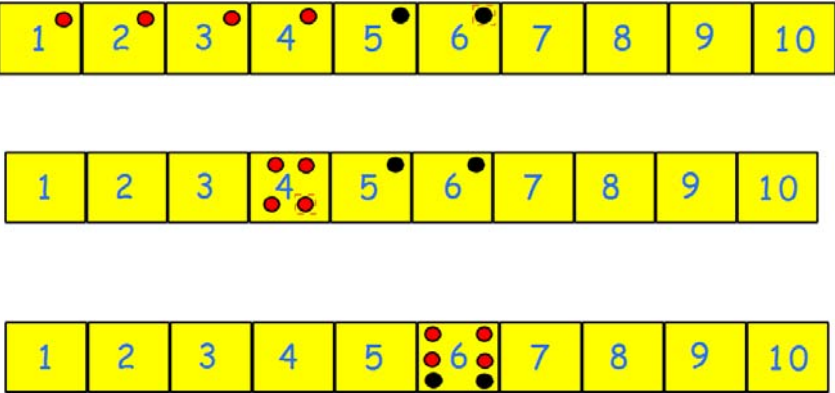
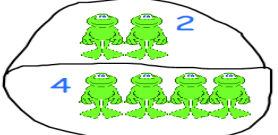
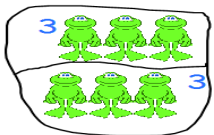
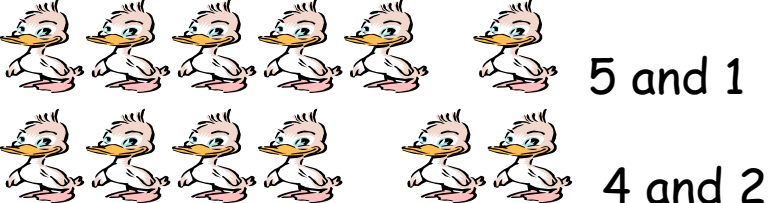
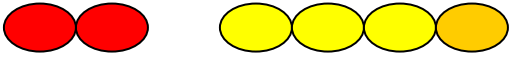
<b>Philippa Smith</b>	<b>Flyford Flavell First School</b>
<b>Kirsty Shaw</b>	<b>Pinvin CE First School</b>
<b>Sharon Cole</b>	<b>Inkberrow First School</b>
<b>Jonathan Rhys</b>	<b>Fladbury CE First School</b>
<b>Penny Boatman</b>	<b>Crowle CE First School</b>
<b>Meryl Gwilliam</b>	<b>Himbleton CE First School</b>
<b>Louise Newman</b>	<b>St Nicholas CE Middle School</b>
<b>Sue Hardwick</b>	<b>Upton Snodsbury CE First School</b>

Draft Policy  
Progression in Calculation  
September 2008:

**ADDITION**


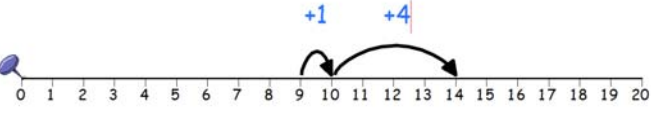
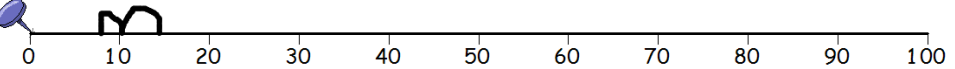
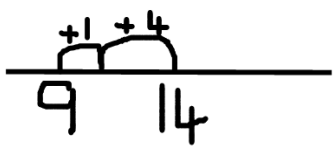
# Draft policy

## Progression in calculation - Addition

Year Group objectives	Models and images	What children might do or record
<p><b>Foundation Stage</b></p> <p><i>counting and understanding number</i></p> <p>Say and use number names in order in familiar contexts</p> <p>Know that a number identifies how many objects in a set</p> <p>Count reliably up to 10 everyday objects</p> <p>Estimate how many objects they can see and check by counting</p> <p>Use language such as more or less to compare two numbers</p> <p>Use ordinal numbers in different contexts</p> <p>Recognise numerals 1 to 9</p> <p><i>Knowing and using number facts</i></p> <p>Observe number relationships and patterns in the environment and use these to derive facts.</p> <p>Find one more or less than a number from 1 to 10</p> <p>Select two groups of objects to make a given total of objects</p> <p><i>Calculating</i></p> <p>Begin to relate addition to combining two groups of objects and subtraction to taking away.</p> <p>In practical activities and discussion begin to use the vocabulary involved in adding and subtracting</p>	<p>Using a number track.</p> <p>4 red counters add 2 black counters</p>  <p>ITPs Counting</p>	<p>Practical recording and explanations of making 6</p> <p><math>4 + 2</math></p>   <p><math>3 + 3</math></p>  <p>5 and 1 4 and 2</p> <p>I have 2 red buttons and 4 yellow buttons so altogether I have 6 buttons</p> <p><math>2 + 4 = 6</math></p>  <p>Begin to start on the biggest number and count on.</p>


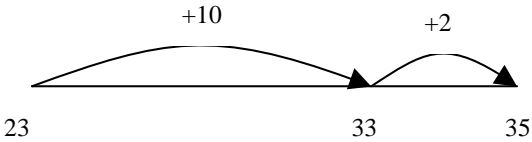
# Draft policy

## Progression in calculation - Addition

Year Group objectives	Models and Images	What children might record
<p><b>Year 1</b></p> <p style="text-align: center;">Counting and understanding number</p> <p>Count reliably at least 20 objects, recognising that when rearranged the number of objects stays the same; estimate a number of objects that can be checked by counting</p> <p>Compare and order numbers, using the related vocabulary; use the equals (=) sign</p> <p>Read and write numerals from 0 to 20 then beyond; use knowledge of place value to position these numbers on a number track and number line</p> <p>Say the number that is 1 more or less than any given number, and 10 more or less for multiples of 10</p> <p style="text-align: center;"><b>Knowing and using number facts</b></p> <p>Derive and recall all pairs of numbers with a total of 10 and addition facts for totals to at least 5; work out the corresponding subtraction facts</p> <p>Recall the doubles of all numbers to at least 10</p> <p style="text-align: center;">Calculating</p> <p>Relate addition to counting on; recognise that addition can be done in any order; use practical and informal written methods to support the addition of a one-digit number or a multiple of 10 to a one-digit or two-digit number</p> <p>Understand subtraction as 'take away' and find a 'difference' by counting up; use practical and informal written methods to support the subtraction of a one-digit number from a one-digit or two-digit number and a multiple of 10 from a two-digit number</p> <p>Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentence</p>	<p>9 children want school dinners then 5 more children say they want dinner. How many dinners shall we order today?</p> <p>On a bead string</p> $9 + 5 = 14$  <p>ITPs</p> <p>Counting</p> <p>Counting on</p> <p>Counting on and back</p> <p>Number Facts</p> <p>Ordering Numbers</p>	<p style="text-align: center;"><math>5 + 9 = 14</math></p> <p>Put the larger number first</p>  <p>On a structured number line</p>  <p>On an empty number line</p> 

# Draft policy

## Progression in calculation - Addition

Year Group objectives	Models and images	What children might record
<p><b>Year 2</b></p> <p><i>Counting and understanding number</i></p> <p>Read and write two-digit and three-digit numbers in figures and words; describe and extend number sequences and recognise odd and even numbers</p> <p>Count up to 100 objects by grouping them and counting in tens, fives or twos; explain what each digit in a two-digit number represents, including numbers where 0 is a place holder; partition two-digit numbers in different ways, including into multiples of 10 and 1</p> <p>Order two-digit numbers and position them on a number line; use the greater than (&gt;) and less than (&lt;) signs</p> <p>Estimate a number of objects; round two-digit numbers to the nearest 10</p> <p><b>Knowing and using number facts</b></p> <p>Derive and recall all addition and subtraction facts for each number to at least 10, all pairs with totals to 20 and all pairs of multiples of 10 with totals up to 100</p> <p>Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20, and the corresponding halves</p> <p><i>Use knowledge of number facts and operations to estimate and check answers to calculations</i></p> <p><b>Calculating</b></p> <p>Add or subtract mentally a one-digit number or a multiple of 10 to or from any two-digit number; use practical and informal written methods to add and subtract two-digit numbers</p> <p>Understand that subtraction is the inverse of addition and vice versa; use this to derive and record related addition and subtraction number sentences</p> <p>Use the symbols +, -, ×, ÷ and = to record and interpret number sentences involving all four operations; calculate the value of an unknown in a number sentence (e.g. □ + 2 = 6, 30 - □ = 24)</p>	<p>There are 23 boys and 12 girls in the class. How many children are there?</p> <p>On a bead string</p> <p style="text-align: center;">23            +10        +2    = 35</p>  <p>ITPs</p> <p>Counting on</p> <p>Counting on and back</p> <p>Number Facts</p> <p>Ordering numbers</p>	<p>Keep the largest number whole and partition smaller number</p> <p style="text-align: center;"><math>12 + 23 = 35</math></p> <p style="text-align: center;"><math>23 + 10 + 2 = 33 + 2 = 35</math></p> 

# Draft policy

## Progression in calculation - Addition

*Year Group objectives*

### Year 3

#### Counting and understanding number

Read, write and order whole numbers to at least 1000 and position them on a number line; count on from and back to zero in single-digit steps or multiples of 10

Partition three-digit numbers into multiples of 100, 10 and 1 in different ways

Round two-digit or three-digit numbers to the nearest 10 or 100 and give estimates for their sums and differences

#### Knowing and using number facts

Derive and recall all addition and subtraction facts for each number to 20, sums and differences of multiples of 10 and number pairs that total 100

Use knowledge of number operations and corresponding inverses, including doubling and halving to estimate and check calculations

#### Calculating

Add or subtract mentally combinations of one-digit and two-digit numbers

Develop and use written methods to record, support or explain addition and subtraction of two-digit and three-digit numbers

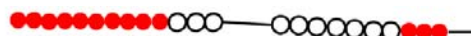
### Models and images

Continue to use 100 bead strings to support children using known facts.

$$3 + 7 = 10 \quad 3 + 10 = 13$$



$$13 + 7 = 20 \quad 13 + 10 = 23$$



$$30 + 70 = 100$$



$$33 + 67 = 100$$



Encourage children to add mentally by using real life contexts and money.

How much would a Freddo bar and a chocolate bar cost altogether? What if we bought two of each?

24p



15p



ITPs

Measuring Scales

Measuring Cylinder

Number Spinners

Counting on

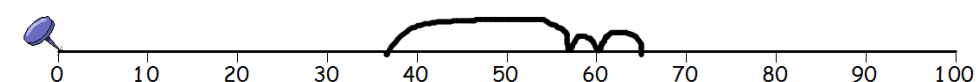
### Ways children might record

Keep the largest number whole and partition smaller number

$$37 + 28 = 65$$

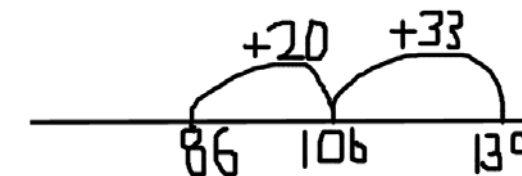
On a structured number line

$$37 + 20 + 3 + 5 = 65$$



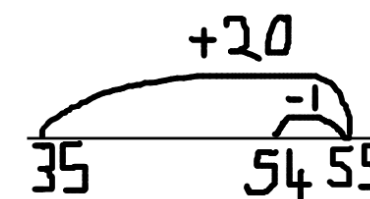
Bridging through 100

$$53 + 86 = 139$$



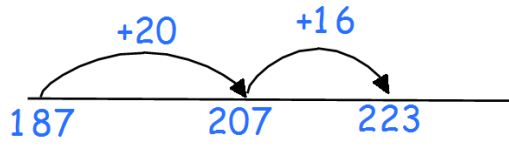
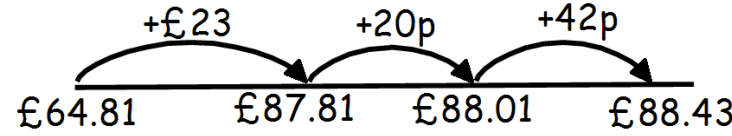
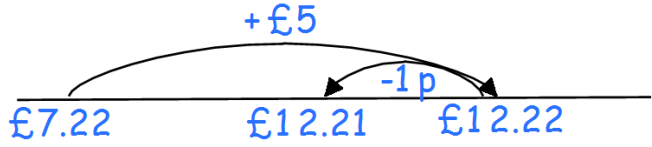
Using known number facts

$$35 + 19 = 35 + 20 - 1 = 54$$



# Draft Policy

## Progression in calculation - Addition









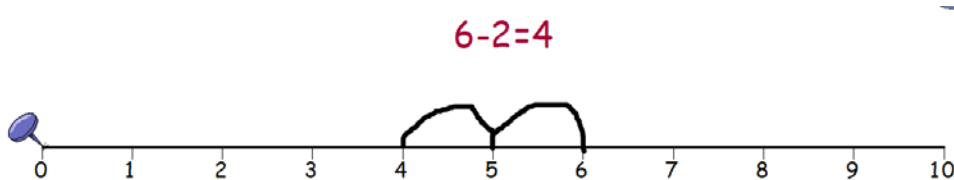
Year Group objectives	Models and images	What children might record
<p><b>Year 4</b></p> <p><b>Counting and understanding number</b>            Recognise and continue number sequences formed by counting on or back in steps of constant size</p> <p>Partition, round and order four-digit whole numbers; use positive and negative numbers in context and position them on a number line; state inequalities using the symbols &lt; and &gt; (e.g. <math>-3 &gt; -5</math>, <math>-1 &lt; +1</math>)</p> <p>Use decimal notation for tenths and hundredths and partition decimals; relate the notation to money and measurement; position one-place and two-place decimals on a number line</p> <p><b>Knowing and using number facts</b>            Use knowledge of addition and subtraction facts and place value to derive sums and differences of pairs of multiples of 10, 100 or 1000</p> <p>Identify the doubles of two-digit numbers; use these to calculate doubles of multiples of 10 and 100 and derive the corresponding halves</p> <p>Use knowledge of rounding, number operations and inverses to estimate and check calculations</p> <p><b>Calculating</b></p> <p>Add or subtract mentally pairs of two-digit whole numbers (e.g. <math>47 + 58</math>, <math>91 - 35</math>)</p> <p>Refine and use efficient written methods to add and subtract two- and three-digit whole numbers and £ p</p> <p>Use a calculator to carry out one and two step calculations involving all 4 operations, recognise negative numbers on the display, correct mistaken entries and interpret display correctly in the context of money</p>	<p>ITPs</p> <p>Decimal Number Line</p> <p>Measuring Cylinder</p> <p>Measuring Scales</p> <p>Thermometer</p> <p>Number Spinners</p>	<p>Keep the largest number whole and partition smaller number</p> <p><math>187 + 36 = 223</math></p>  <p>Money and decimals</p> <p><math>£64.81 + £23.62</math></p>  <p>Using known number facts</p> <p><math>£7.22 + £4.99</math></p>  <p>Using a written method</p> $  \begin{array}{r}  + 366 \\  + 458 \\  \hline  14 \\  110 \\  700 \\  \hline  824  \end{array}  $

Draft Policy  
Progression in Calculation  
September 2008:

**SUBTRACTION**

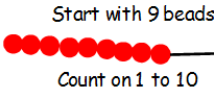
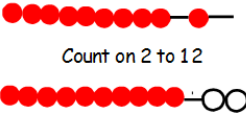
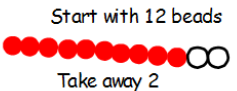
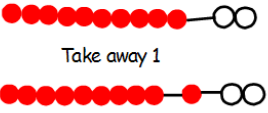
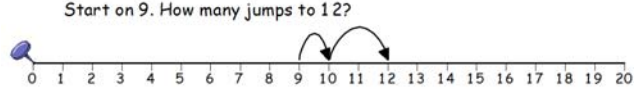
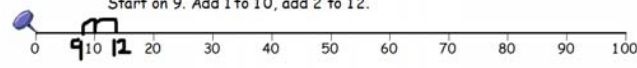
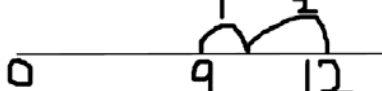
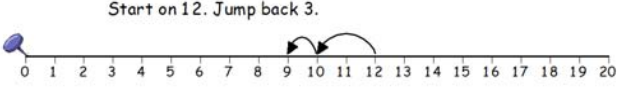
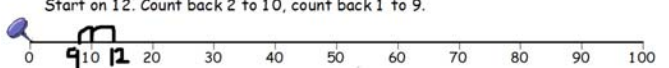
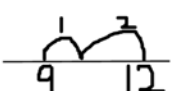
# Draft policy

## Progression in calculation - Subtraction

Year Group objectives	Models and images	What children might do or record
<p><b>Foundation Stage</b></p> <p><b>Counting and understanding number</b></p> <p>Say and use number names in order in familiar contexts</p> <p>Know that a number identifies how many objects in a set</p> <p>Count reliably up to 10 everyday objects</p> <p>Estimate how many objects they can see and check by counting</p> <p>Use language such as more or less to compare two numbers</p> <p>Use ordinal numbers in different contexts</p> <p>Recognise numerals 1 to 9</p> <p><b>Knowing and using number facts</b></p> <p>Observe number relationships and patterns in the environment and use these to derive facts.</p> <p>Find one more or less than a number from 1 to 10</p> <p>Select two groups of objects to make a given total of objects</p> <p style="text-align: center;"><b>Calculating</b></p> <p>Begin to relate addition to combining two groups of objects and subtraction to taking away.</p> <p>In practical activities and discussion begin to use the vocabulary involved in adding and subtracting</p>	<p><i>We have got 6 shells. We put 2 into the bucket and there are 4 left.</i></p>   <p>There are 6 shells. Take 2 away. There are 4 left.</p>   <p>ITPs Number Facts Counting</p>	<p>How many ways can you split these 6 buttons into 2 groups?</p>   $6-1=5$  $6-2=4$  $6-3=3$ <p>Counting back on a number line</p>  <p style="text-align: center;"><math>6-2=4</math></p>

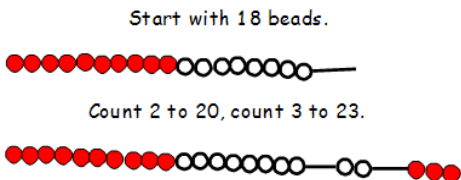
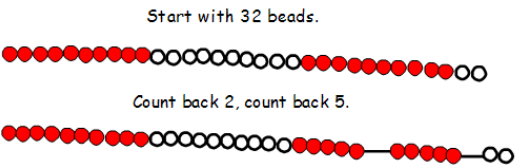
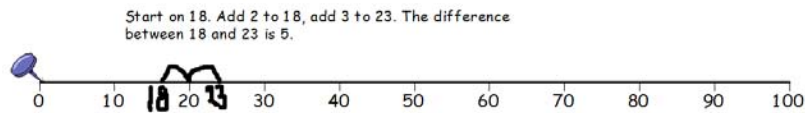
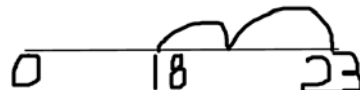
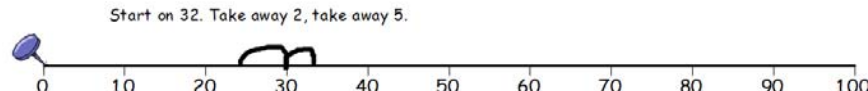

# Draft policy

## Progression in calculation - Subtraction

Year Group objectives	Models and Images to support teaching	Ways children might record
<p><b>Year 1</b></p> <p style="text-align: center;"><b>Counting and understanding number</b></p> <p>Count reliably at least 20 objects, recognising that when rearranged the number of objects stays the same; estimate a number of objects that can be checked by counting</p> <p>Compare and order numbers, using the related vocabulary; use the equals (=) sign</p> <p style="color: blue;">Read and write numerals from 0 to 20 then beyond; use knowledge of place value to position these numbers on a number track and number line</p> <p>Say the number that is 1 more or less than any given number, and 10 more or less for multiples of 10</p> <p style="text-align: center;"><b>Knowing and using number facts</b></p> <p style="color: blue;">Derive and recall all pairs of numbers with a total of 10 and addition facts for totals to at least 5; work out the corresponding subtraction facts</p> <p>Recall the doubles of all numbers to at least 10</p> <p style="text-align: center;"><b>Calculating</b></p> <p>Relate addition to counting on; recognise that addition can be done in any order; use practical and informal written methods to support the addition of a one-digit number or a multiple of 10 to a one-digit or two-digit number</p> <p>Understand subtraction as 'take away' and find a 'difference' by counting up; use practical and informal written methods to support the subtraction of a one-digit number from a one-digit or two-digit number and a multiple of 10 from a two-digit number</p> <p style="color: blue;">Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentence</p>	<p>Children need to look at the numbers in a calculation and decide if it is going to be easier and quicker to 'count on' or 'count back'.</p> <p>To make this decision children need to develop a 'feel' for the relative size of numbers.</p> <p>Most children are more successful when counting on, but when a 'small' number is subtracted from a 'big' number counting back can be the most efficient method.</p> <p>On a bead string</p> <p style="text-align: center;"><math>12 - 9 = 3</math></p> <p style="text-align: center;">Start with 9 beads</p>  <p style="text-align: center;">Count on 1 to 10</p>  <p style="text-align: center;">Count on 2 to 12</p> <p style="text-align: center;"><math>12 - 3 = 9</math></p> <p style="text-align: center;">Start with 12 beads</p>  <p style="text-align: center;">Take away 2</p>  <p style="text-align: center;">Take away 1</p> <p>To become effective calculators children need to be able to jump in 'chunks' rather than in ones, so it is vital that children learn to use facts such as <math>3 = 2 + 1</math>, when they are calculating with larger numbers.</p>	<p><b>Counting on</b>      <math>12 - 9 = 3</math></p> <p style="text-align: center;">Start on 9. How many jumps to 12?</p>  <p>On a structured number line    <math>12 - 9 = 3</math></p> <p style="text-align: center;">Start on 9. Add 1 to 10, add 2 to 12.</p>  <p>On an empty number line    <math>12 - 9 = 3</math> 9 and 3 more is 12, the difference between 9 and 12 is 3</p>  <p><b>Counting back</b>      <math>12 - 3 = 9</math></p> <p style="text-align: center;">Start on 12. Jump back 3.</p>  <p>On a structured number line    <math>12 - 3 = 9</math></p> <p style="text-align: center;">Start on 12. Count back 2 to 10, count back 1 to 9.</p>  <p>On an empty number line    <math>12 - 3 = 9</math> 12 count back 3 is 9</p> 


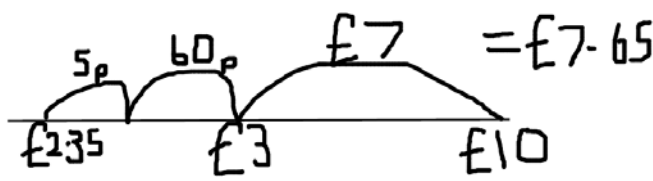
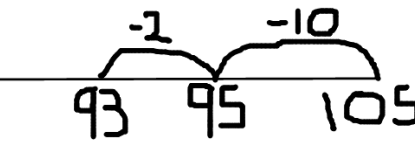
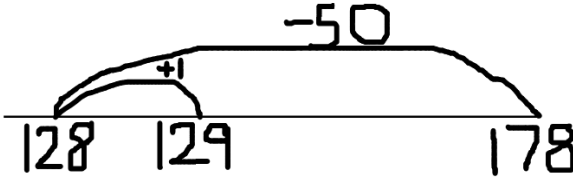
# Draft policy

## Progression in calculation - Subtraction

Year Group objectives	Models and images to support teaching	Ways children might record
<p><b>Year 2</b></p> <p>Counting and understanding number Read and write two-digit and three-digit numbers in figures and words; describe and extend number sequences and recognise odd and even numbers</p> <p>Count up to 100 objects by grouping them and counting in tens, fives or twos; explain what each digit in a two-digit number represents, including numbers where 0 is a place holder; partition two-digit numbers in different ways, including into multiples of 10 and 1</p> <p>Order two-digit numbers and position them on a number line; use the greater than (&gt;) and less than (&lt;) signs</p> <p>Estimate a number of objects; round two-digit numbers to the nearest 10</p> <p><b>Knowing and using number facts</b> Derive and recall all addition and subtraction facts for each number to at least 10, all pairs with totals to 20 and all pairs of multiples of 10 with totals up to 100</p> <p>Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20, and the corresponding halves</p> <p>Use knowledge of number facts and operations to estimate and check answers to calculations</p> <p><b>Calculating</b></p> <p>Add or subtract mentally a one-digit number or a multiple of 10 to or from any two-digit number</p> <p>Use practical and informal written methods to add and subtract two-digit numbers</p> <p>Understand that subtraction is the inverse of addition and vice versa; use this to derive and record related addition and subtraction number sentences</p> <p>Use the symbols +, -, ×, ÷ and = to record and interpret number sentences involving all four operations; calculate the value of an unknown in a number sentence (e.g. □ ÷ 2 = 6, 30 - □ = 24)</p>	<p>Children need to look at the numbers in a calculation and decide if it is going to be easier and quicker to 'count on' or 'count back'.</p> <p>To make this decision children need to develop a 'feel' for the relative size of numbers.</p> <p>Most children are more successful when counting on, but when a 'small' number is subtracted from a 'big' number counting back can be the most efficient method.</p> <p>On a bead string</p> <p style="text-align: center;"><math>23 - 18 = 5</math></p> <p style="text-align: center;">Start with 18 beads.</p>  <p style="text-align: center;">Count 2 to 20, count 3 to 23.</p> <p style="text-align: center;"><math>32 - 7 = 25</math></p> <p style="text-align: center;">Start with 32 beads.</p>  <p style="text-align: center;">Count back 2, count back 5.</p> <p>To become effective calculators children need to be able to jump in 'chunks' rather than in ones, so it is vital that children learn to use facts such as <math>7 = 5 + 2</math>, when they are calculating with larger numbers.</p>	<p><b>Counting on</b>      <math>23 - 18</math></p> <p style="text-align: center;">Start on 18. Add 2 to 18, add 3 to 23. The difference between 18 and 23 is 5.</p>  <p>On an empty number line <math>23 - 18 = 5</math></p> <p>Start on 18, jump 2 to 20, jump 3 to 23, so 23 is 5 more than 18.</p> <p style="text-align: center;">2      3      = 5</p>  <p><b>Counting back</b>      <math>32 - 7 = 25</math></p> <p style="text-align: center;">Start on 32. Take away 2, take away 5.</p>  <p>On an empty number line <math>32 - 7 = 25</math></p> <p>Start on 32, jump back 2 to 30, jump back 5 to 25.</p> <p style="text-align: center;">-5      -2</p> 

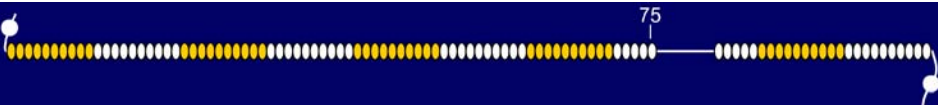

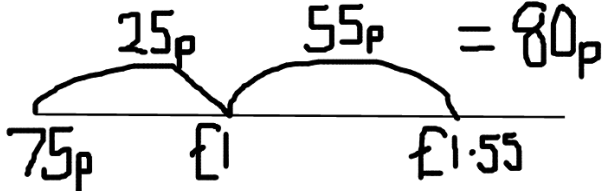
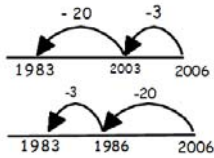
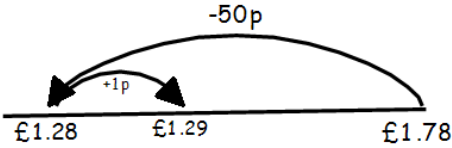
# Draft policy

## Progression in calculation - Subtraction

Year Group objectives	Models and images to support teaching	Ways children might record
<p><b>Year 3</b></p> <p>Counting and understanding number</p> <p>Read, write and order whole numbers to at least 1000 and position them on a number line; count on from and back to zero in single-digit steps or multiples of 10</p> <p>Partition three-digit numbers into multiples of 100, 10 and 1 in different ways</p> <p>Round two-digit or three-digit numbers to the nearest 10 or 100 and give estimates for their sums and differences</p> <p><i>Knowing and using number facts</i></p> <p>Derive and recall all addition and subtraction facts for each number to 20, sums and differences of multiples of 10 and number pairs that total 100</p> <p>Use knowledge of number operations and corresponding inverses, including doubling and halving to estimate and check calculations</p> <p><i>Calculating</i></p> <p>Add or subtract mentally combinations of one-digit and two-digit numbers</p> <p>Develop and use written methods to record, support or explain addition and subtraction of two-digit and three-digit numbers</p>	<p>Children need to look at the numbers in a calculation and decide if it is going to be easier and quicker to 'count on' or 'count back'.</p> <p>To make this decision children need to develop a 'feel' for the relative size of numbers.</p> <p>Most children are more successful when counting on, but when a 'small' number is subtracted from a 'big' number counting back can be the most efficient method.</p> <p>ITP Counting on and back</p>  <p>To become effective calculators children need to be able to jump in big 'chunks' rather than in tens and ones, so it is vital that children learn to use facts such as : <math>76 + 4 = 80</math>, <math>80 + 20 = 100</math>, when they are calculating with larger numbers</p>	<p><u>Counting on</u></p> <p>Sita had £10. She spent £2.35. How much money did she have left?</p>  <p><u>Counting back</u></p> <p><math>105 - 12 = 93</math></p>  <p>Using known number facts</p> <p><math>178 - 49 = 128</math></p> 

# Draft policy

## Progression in calculation - Subtraction

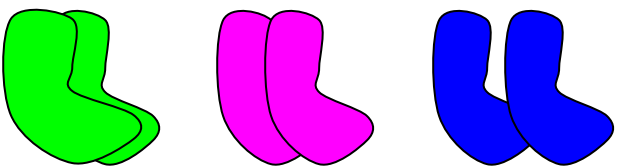
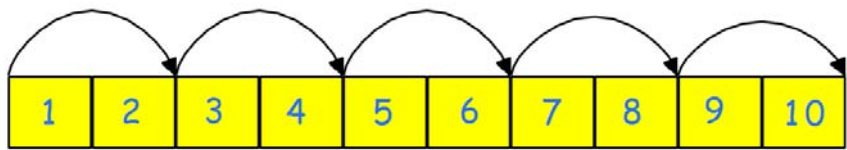

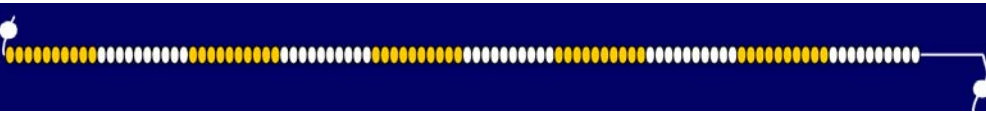

Year Group objectives	Models and images to support teaching	Ways children might record
<p><b>Year 4</b>  <i>Counting and understanding number</i>            Recognise and continue number sequences formed by counting on or back in steps of constant size</p> <p>Partition, round and order four-digit whole numbers; use positive and negative numbers in context and position them on a number line; state inequalities using the symbols <math>&lt;</math> and <math>&gt;</math> (e.g. <math>-3 &gt; -5</math>, <math>-1 &lt; +1</math>)</p> <p>Use decimal notation for tenths and hundredths and partition decimals; relate the notation to money and measurement; position one-place and two-place decimals on a number line</p> <p>Use decimal notation for tenths and hundredths and partition decimals; relate the notation to money and measurement; position one-place and two-place decimals on a number line</p> <p>Knowing and using number facts</p> <p>Use knowledge of addition and subtraction facts and place value to derive sums and differences of pairs of multiples of 10, 100 or 1000</p> <p>Identify the doubles of two-digit numbers; use these to calculate doubles of multiples of 10 and 100 and derive the corresponding halves</p> <p>Use knowledge of rounding, number operations and inverses to estimate and check calculations</p> <p><b>Calculating</b></p> <p>Add or subtract mentally pairs of two-digit whole numbers (e.g. <math>47 + 58</math>, <math>91 - 35</math>)</p> <p>Refine and use efficient written methods to add and subtract two- and three-digit whole numbers and <math>\pounds.p</math></p> <p>Use a calculator to carry out one and two step calculations involving all 4 operations, recognise negative numbers on the display, correct mistaken entries and interpret display correctly in the context of money</p>	<p>Children need to look at the numbers in a calculation and decide if it is going to be easier and quicker to 'count on' or 'count back'.</p> <p>To make this decision children need to develop a 'feel' for the relative size of numbers.</p> <p>Most children are more successful when counting on, but when a 'small' number is subtracted from a 'big' number counting back can be the most efficient method.</p> <p>ITP Counting on and back</p>  <p>To become effective calculators children need to be able to jump in big 'chunks' rather than in tens and ones. It is vital that children learn to use facts such as: <math>75 + 25 = 100</math>, when they are calculating with larger numbers.</p>	<p><b>Counting on</b>            Asif, Vicky and Nita go to town by bus.            This is what they pay.</p>  <p>How much more does Nita pay than Asif?</p>  <p><b>Counting back</b></p> <p><math>2006 - 23 = 1983</math></p>  <p>Using place value and known facts</p> <p><math>\pounds 1.78 - \pounds 0.49 = \pounds 1.28</math></p> 

Draft Policy  
Progression in Calculation  
September 2008:

**MULTIPLICATION**

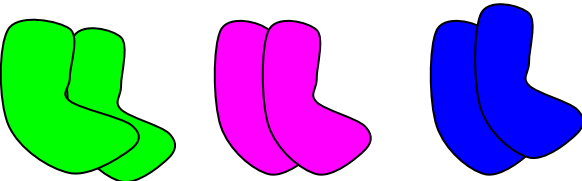
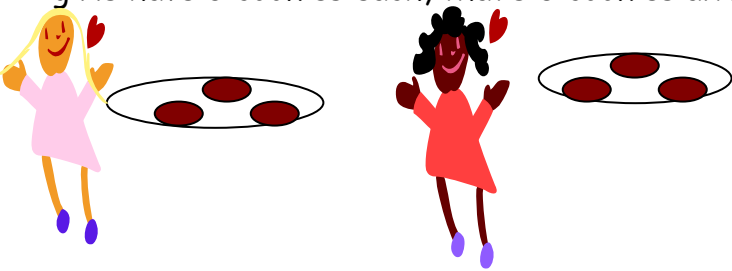
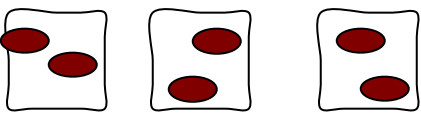

# Draft policy

## Progression in calculation - Multiplication

Year Group objectives	Models and images	Ways in which children might record
<p><b>Foundation Stage</b></p> <p><i>Counting and understanding number</i></p> <p>Say and use number names in order in familiar contexts</p> <p>Know that a number identifies how many objects in a set</p> <p>Count reliably up to 10 everyday objects</p> <p>Estimate how many objects they can see and check by counting</p> <p>Count aloud in ones, twos, fives and tens</p> <p>Use language such as more or less to compare two numbers</p> <p>Use ordinal numbers in different contexts</p> <p>Recognise numerals 1 to 9</p> <p><i>Knowing and using number facts</i></p> <p>Observe number relationships and patterns in the environment and use these to derive facts.</p> <p>Select two groups of objects to make a given total of objects</p> <p style="text-align: center;"><b>Calculating</b></p> <p>Count repeated groups of the same size</p> <p>Share objects into equal groups and count how many in each group</p>	<p>I have three pairs of socks in the bag. How many socks are there?</p>  <p>Check the answer by counting the socks in ones and then in twos.</p> <p>Hopping in 2s along a number track</p>  <p>I jump 2, jump 2, jump 2, jump 2, jump 2. I land on 10..</p> <p>Counting fingers in 5s.</p>  <p>5, 10, 15, 20.      20 fingers altogether.</p> <p>Counting beads in 10s.</p>  <p>10, 20, 30, 40, 50, 60, 70, 80, 90, 100</p>	<p>'I collected 2 big bears, 2 medium bears and 2 baby bears. I have got 6 bears altogether.'</p>  <p>'My beanbag landed in the 2 bucket 4 times. I scored 8 points.'</p>



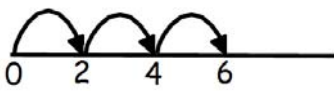
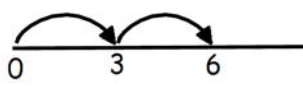
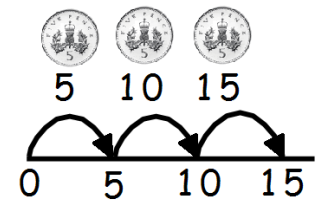
# Draft policy

## Progression in calculation - Multiplication

Year Group objectives	Models and images	Ways in which children might record
<p><b>Year 1</b></p> <p>Counting and understanding number Count reliably at least 20 objects, recognising that when rearranged the number of objects stays the same; estimate a number of objects that can be checked by counting</p> <p>Compare and order numbers, using the related vocabulary; use the equals (=) sign</p> <p>Read and write numerals from 0 to 20 then beyond; use knowledge of place value to position these numbers on a number track and number line</p> <p>Use the vocabulary of halves and quarters in context</p> <p><b>Knowing and using number facts</b> Count on and back in ones, twos, fives and tens and use this knowledge to derive the multiplies of 2, 5 and 10 to the tenth multiple</p> <p>Recall the doubles of all numbers to at least 10</p> <p style="text-align: center;"><i>Calculating</i></p> <p>Solve practical problems that involve combining groups of 2, 5 and 10, or sharing into equal groups</p>	<p>Counting in 2s</p>  <p>3 pairs of socks, there are 6 socks altogether.</p> <p>2 girls have 3 cookies each, that's 6 cookies altogether.</p>  <p>3 bags of cookies, 2 in each bag, that's 6 cookies altogether.</p>  <p>Count in 10s.</p>  <p>10 20 30 40 50</p> <p>50p altogether.</p>	<p>2 girls have 3 cookies each, that's 6 cookies altogether. <math>3 + 3 = 6</math></p> <p>3 bags of cookies, 2 in each bag, that's 6 cookies altogether. <math>2 + 2 + 2 = 6</math></p>

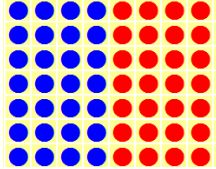
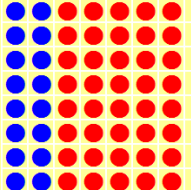
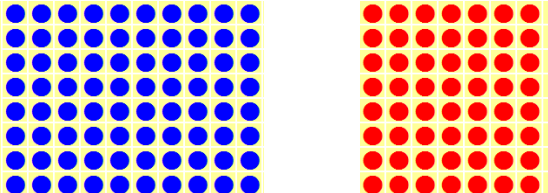

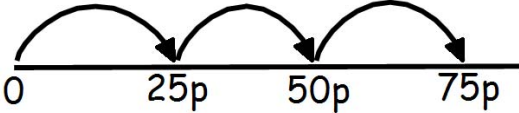
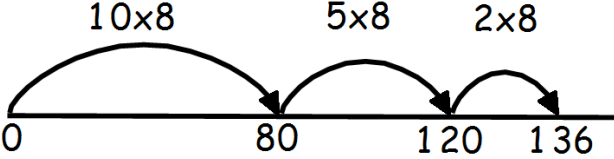
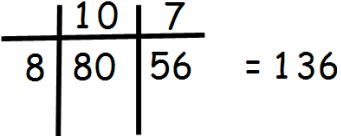
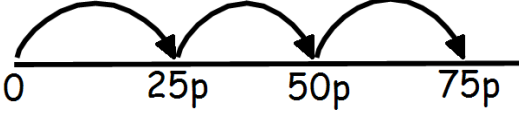
# Draft policy

## Progression in calculation - Multiplication

Year Group objectives	Models and images	Ways in which children might record
<p><b>Year 2</b></p> <p style="text-align: center;"><b>Counting and understanding number</b></p> <p>Read and write two-digit and three-digit numbers in figures and words; describe and extend number sequences and recognise odd and even numbers</p> <p>Count up to 100 objects by grouping them and counting in tens, fives or twos; explain what each digit in a two-digit number represents, including numbers where 0 is a place holder; partition two-digit numbers in different ways, including into multiples of 10 and 1</p> <p>Order two-digit numbers and position them on a number line; use the greater than (&gt;) and less than (&lt;) signs</p> <p>Estimate a number of objects; round two-digit numbers to the nearest 10</p> <p>Find one half and three quarters of shapes and sets of objects</p> <p><b>Knowing and using number facts</b></p> <p>Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20, and the corresponding halves</p> <p>Derive and recall multiplication facts for the 2,5 and 10 times tables and the related division facts, recognise multiplies of 2,5 and 10</p> <p>Use knowledge of number facts and operations to estimate and check answers to calculations,</p> <p style="text-align: center;"><b>Calculating</b></p> <p>Represent repeated addition and arrays as multiplication and sharing and repeated subtraction (grouping) as division, use practical and informal methods and related vocabulary to support multiplication and division, including calculations with remainders.</p> <p>Use the symbols = - x and ÷ to record and interpret number sentences involving all four operations; calculate The value of an unknown in a number sentence e.g. <math>\square \div 2 = 6</math></p>	<p>What number sentences could we write about these arrays?</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>3 lots of 2, 3 groups of 2, <math>2 + 2 + 2 = 6</math> <math>2 \times 3 = 6</math> 2 multiplied by 3</p> <div style="text-align: center;">  </div> <p>2 lots of 3 2 groups of 3 <math>3 + 3 = 6</math> <math>3 \times 2 = 6</math> 3 multiplied by 2</p> <div style="text-align: center;">  </div> <p>ITPS Multiplication Facts Multiarray</p>	<p>I have 3 5p coins how much money do I have?</p> <div style="text-align: center;">  </div> <p><math>5p + 5p + 5p = 15p</math></p> <p style="text-align: center;"><math>5p \times 3 = 15p</math></p>

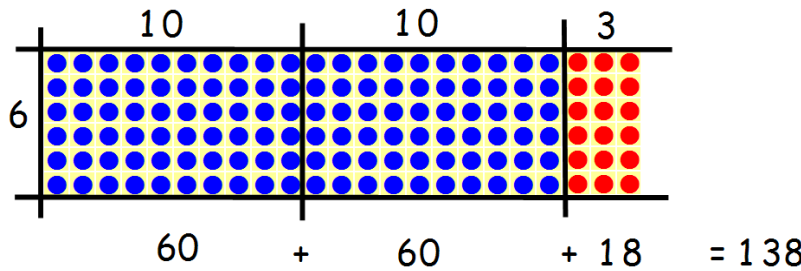
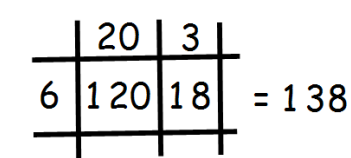
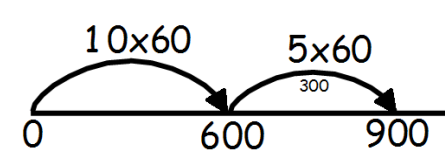
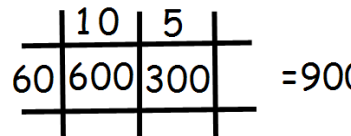
# Draft policy

## Progression in calculation - Multiplication

Year Group objectives	Models and images	Ways in which children might record
<p><b>Year 3</b></p> <p style="text-align: center;"><b>Counting and understanding number</b></p> <p>Read, write and order whole numbers to at least 1000 and position them on a number line; count on from and back to zero in single-digit steps or multiples of 10</p> <p>Partition three-digit numbers into multiples of 100, 10 and 1 in different ways</p> <p>Round two-digit or three-digit numbers to the nearest 10 or 100 and give estimates for their sums and differences</p> <p>Read and write proper fractions (e.g. <math>\frac{3}{4}</math>) interpreting the denominator as the parts of a whole and the numerator as the number of parts; identify and estimate fractions of shapes, use diagrams to compare fractions and establish equivalence.</p> <p style="text-align: center;"><b>Knowing and using number facts</b></p> <p>Derive and recall multiplication facts for the 2,3,4,5,6 and 10 times tables and the corresponding division facts; recognise multiples of 2,5 or 10 up to 1000</p> <p><b>Calculating</b></p> <p>Multiply one digit and two digit numbers (e.g. <math>13 \times 3</math>, <math>50 \div 4</math>) round remainders up or down depending on the context</p> <p>Understand that division is the inverse of multiplication and vice versa, use this to derive and record related multiplication and division number sentences</p> <p>Understand that division is the inverse of multiplication and vice versa; use this to derive and record related multiplication and division number sentences</p> <p>Find unit fractions of numbers and quantities e.g. <math>\frac{1}{2}</math> <math>\frac{1}{3}</math> <math>\frac{1}{4}</math> and <math>\frac{1}{6}</math> of 12 litres</p>	<p>Use arrays to model deriving new facts from known facts eg:  <math>8 \times 7 = \text{double } 4 \times 7 = 28 + 28 = 56</math></p>  <p><math>8 \times 7 = 2 \times 7 + 5 \times 7 = 14 + 35 = 56</math></p>  <p><math>17 \times 8 = 10 \times 8 + 7 \times 8 = 80 + 56 = 136</math></p>  <p>Apples cost 25p each. How much do 3 apples cost?</p>  <p><math>25p + 25p + 25p = 75p</math></p>  <p>ITPs          Multiplication Facts          Multiarray          Number Dials</p>	<p><math>8 \times 7 = 28 + 28 = 56</math></p> <p><math>8 \times 7 = 16 + 40 = 56</math></p> <p><math>17 \times 8</math></p>   <p>Apples cost 25p each. How much do 3 apples cost?</p> 

# Draft Policy

## Progression in calculation - Multiplication

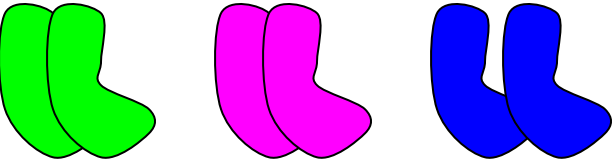
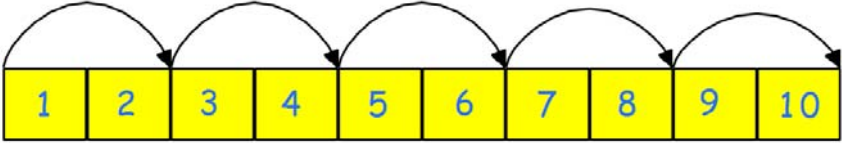



Year Group objectives	Models and images	Ways in which children might record
<p><b>Year 4</b>     <b>Counting and understanding number</b></p> <p>Recognise and continue number sequences formed by counting on or back in steps of constant size</p> <p>Use decimal notation for tenths and hundredths and partition decimals; relate the notation to money and measurement; position one-place and two-place decimals on a number line</p> <p>Recognise the equivalence between decimal and fraction forms of one half, quarters, tenths and hundredths</p> <p>Use diagrams to identify equivalent fractions e.g. <math>\frac{3}{4}</math> and <math>\frac{6}{8}</math> interpret mixed numbers and position them on a number line e.g. <math>3\frac{1}{2}</math></p> <p>Use the vocabulary of ratio and proportion to describe the relationship between two quantities e.g. There are two red beads to every 3 blue beads or 2 in every 5 beads are red. Estimate a proportion - about one quarter of the apples in the box are green</p> <p style="text-align: center;"><b>Knowing and using number facts</b></p> <p>Identify the doubles of two-digit numbers; use these to calculate doubles of multiples of 10 and 100 and derive the corresponding halves</p> <p>Derive and recall multiplication facts up to <math>10 \times 10</math>, the corresponding division facts and multiples of numbers up to 10 up to the tenth multiple</p> <p>Use knowledge of rounding, number operations and inverses to estimate and check calculations</p> <p>Identify pairs of fractions that total one</p> <p style="text-align: center;"><b>Calculating</b></p> <p>Multiply and divide numbers to 1000 by 10 and then 100 (whole number answers) understanding the effect, relate to scaling up or down</p> <p>Develop and use written methods to record, support and explain multiplication and division of two digit numbers by a one digit number including division and remainders (e.g. <math>15 \times 9</math>, <math>98 \div 6</math>)</p> <p>Find fractions of numbers, quantities or shapes e.g. <math>\frac{1}{3}</math> of plums</p> <p>Use a calculator to carry out one and two step calculations involving all four operations recognising negative numbers in the display, correct mistaken entries and interpret the display correctly in the context of money</p>	<p>Use known number facts:</p> $6 \times 23 = 6 \times 20 + 6 \times 3$ 	<p><math>6 \times 23 = 138</math></p>  <p>A tyrannosaurus rex was approximately 60 times as long as a lizard. A lizard's tail is 15cm long. About how long was the tail of a tyrannosaurus rex?</p> $60 \times 15\text{cm} = 900\text{cm} = 9\text{m}$   <div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: fit-content; margin: 10px auto;"> <p style="text-align: center;">Tail of a T Rex is about 900cm or 9m long.</p> </div>

Draft Policy  
Progression in Calculation  
September 2008:

**DIVISION**

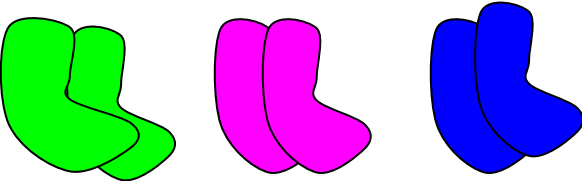

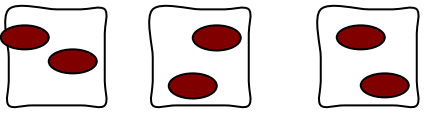


# Draft policy

## Progression in calculation - Division

Year Group objectives	Models and images to support teaching	Ways in which children might record
<p><b>Foundation Stage</b></p> <p><i>Counting and understanding number</i></p> <p>Say and use number names in order in familiar contexts</p> <p>Know that a number identifies how many objects in a set</p> <p>Count reliably up to 10 everyday objects</p> <p>Estimate how many objects they can see and check by counting</p> <p>Count aloud in ones, twos, fives and tens</p> <p>Use language such as more or less to compare two numbers</p> <p>Use ordinal numbers in different contexts</p> <p>Recognise numerals 1 to 9</p> <p><b>Knowing and using number facts</b></p> <p>Observe number relationships and patterns in the environment and use these to derive facts.</p> <p>Select two groups of objects to make a given total of objects</p> <p style="text-align: center;"><b>Calculating</b></p> <p>Count repeated groups of the same size</p> <p>Share objects into equal groups and count how many in each group</p>	<p style="text-align: center;"><i>Models and images to support teaching</i></p> <p>I have 6 socks in the bag. How many pairs of socks are there?</p>  <p>Check the answer by counting the socks in ones and then in twos.</p> <p>Hopping in 2s along a number track I landed on 10. How many jumps of 2?</p>  <p>Counting fingers in 5s.</p>  <p>20 fingers, how many hands?</p> <p>We have got 4 cartons of milk, so 2 cats can have 2 cartons each.</p> 	<p>'I have got 6 bears, that's 2 big ones, 2 medium ones and 2 small ones.'</p>  <p>'I scored 8 points. I threw my beanbag into the bucket 4 times.'</p>


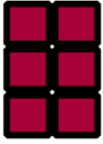

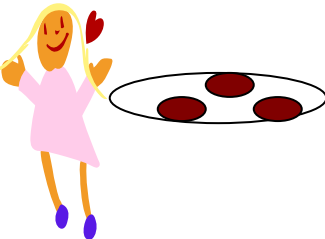
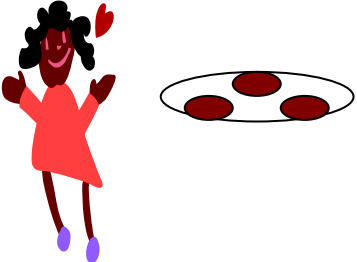
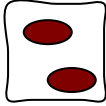
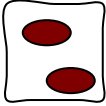
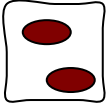

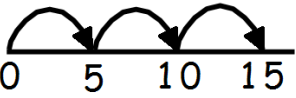
# Draft policy

## Progression in calculation - Division

Year Group objectives	Models and images	Ways in which children might record
<p><b>Year 1</b></p> <p>Counting and understanding number Count reliably at least 20 objects, recognising that when rearranged the number of objects stays the same; estimate a number of objects that can be checked by counting</p> <p>Compare and order numbers, using the related vocabulary; use the equals (=) sign</p> <p>Read and write numerals from 0 to 20 then beyond; use knowledge of place value to position these numbers on a number track and number line</p> <p>Use the vocabulary of halves and quarters in context</p> <p><b>Knowing and using number facts</b> Count on and back in ones, twos, fives and tens and use this knowledge to derive the multiplies of 2, 5 and 10 to the tenth multiple</p> <p>Recall the doubles of all numbers to at least 10</p> <p style="text-align: center;"><i>Calculating</i></p> <p>Solve practical problems that involve combining groups of 2, 5 and 10, or sharing into equal groups</p> <p>Counting in equal groups using real life objects and pictures 3 lots of 2 or 2 lots of 3</p>	<p>Counting in 2s</p>  <p>We have got 6 socks. How many pairs have we got?</p> <p>Division as sharing 6 cookies shared between 2 girls, 3 cookies each.</p>  <p>Division as grouping 6 cookies grouped in 2s, 3 bags of cookies.</p>  <p>I have got 50p. How many 10p coins have I got?</p>  <p style="text-align: center;">10 20 30 40 50</p>	<p>We have got 8 vehicles, that's 4 groups of 2. <math>2 + 2 + 2 + 2 = 8</math></p> 

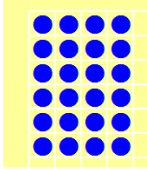


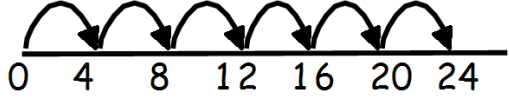
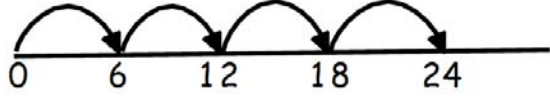
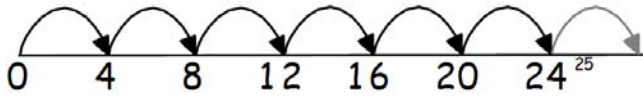
# Draft policy

## Progression in calculation - Division

Year Group objectives	Models and images	Ways in which children might record
<p><b>Year 2</b></p> <p style="text-align: center;"><b>Counting and understanding number</b></p> <p>Read and write two-digit and three-digit numbers in figures and words; describe and extend number sequences and recognise odd and even numbers</p> <p>Count up to 100 objects by grouping them and counting in tens, fives or twos; explain what each digit in a two-digit number represents, including numbers where 0 is a place holder; partition two-digit numbers in different ways, including into multiples of 10 and 1</p> <p>Order two-digit numbers and position them on a number line; use the greater than (&gt;) and less than (&lt;) signs</p> <p>Estimate a number of objects; round two-digit numbers to the nearest 10</p> <p>Find one half and three quarters of shapes and sets of objects</p> <p><b>Knowing and using number facts</b></p> <p>Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20, and the corresponding halves</p> <p>Derive and recall multiplication facts for the 2,5 and 10 times tables and the related division facts, recognise multiples of 2,5 and 10</p> <p>Use knowledge of number facts and operations to estimate and check answers to calculations</p> <p style="text-align: center;"><b>Calculating</b></p> <p>Represent repeated addition and arrays as multiplication and sharing and repeated subtraction (grouping) as division, use practical and informal methods and related vocabulary to support multiplication and division, including calculations with remainders.</p> <p>Use the symbols = - x and ÷ to record and interpret number sentences involving all four operations; calculate The value of an unknown in a number sentence e.g. <math>\square \div 2 = 6</math></p>	<p>What number sentences could we write about these arrays?</p> <div style="display: flex; justify-content: space-around;">   </div> <p>6 grouped into 2s is 3 groups  <math>2 + 2 + 2 = 6</math>  <math>6 \div 2 = 3</math></p> <p>6 divided into 2s is 3 groups</p>  <p>6 grouped into 3s is 2 groups</p> <p>3 + 3 = 6  <math>6 \div 3 = 2</math></p> <p>6 divided into 3s is 2 groups</p> <p><b>Division as sharing</b>          6 cookies shared between 2 girls, 3 cookies each.</p> <div style="display: flex; justify-content: space-around;">   </div> <p><b>Division as grouping</b>          6 cookies grouped in 2s, 3 bags of cookies.</p> <div style="display: flex; justify-content: space-around;">    </div> <p><math>6 \div 2 = 3</math> describes both problems</p> <p>ITPs Grouping</p>	<p>I have 15p how many 5p coins have I got?</p> <div style="text-align: center;">  <p>5    10    15</p>  <p>0    5    10    15</p> <p><math>5p + 5p + 5p = 15p</math></p> <p><math>15p \div 5p = 3</math></p> </div>

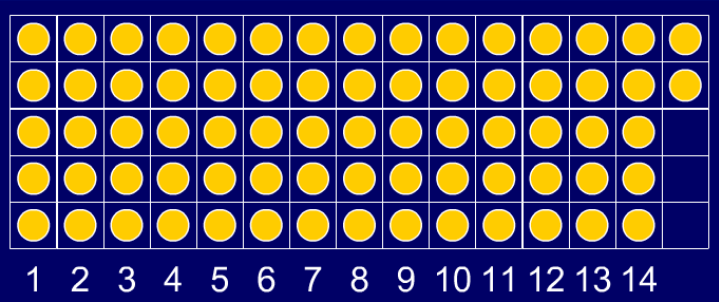
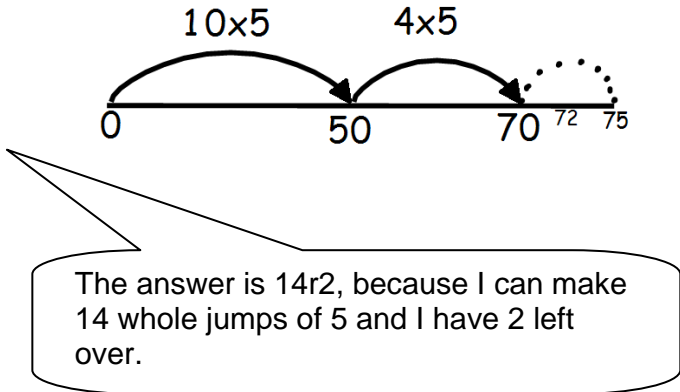
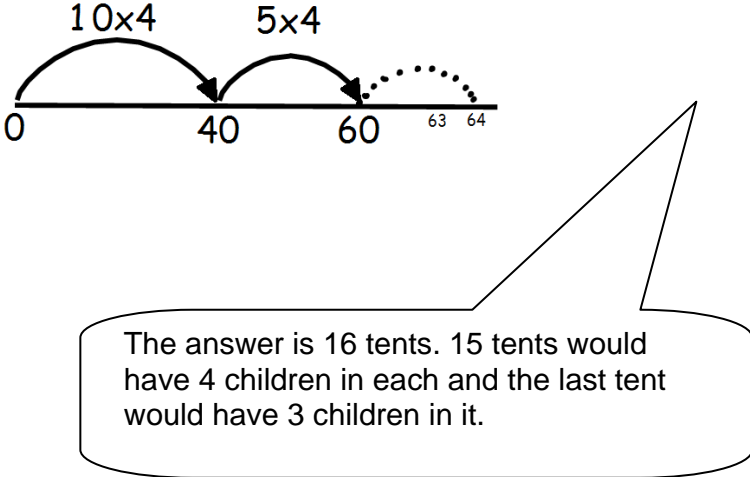
# Draft policy

## Progression in calculation - Division

Year Group objectives	Models and images	Ways in which children might record
<p><b>Year 3</b></p> <p style="text-align: center;"><b>Counting and understanding number</b></p> <p>Read, write and order whole numbers to at least 1000 and position them on a number line; count on from and back to zero in single-digit steps or multiples of 10</p> <p>Partition three-digit numbers into multiples of 100, 10 and 1 in different ways</p> <p>Round two-digit or three-digit numbers to the nearest 10 or 100 and give estimates for their sums and differences</p> <p>Read and write proper fractions (e.g. <math>\frac{3}{4}</math>) interpreting the denominator as the parts of a whole and the numerator as the number of parts; identify and estimate fractions of shapes, use diagrams to compare fractions and establish equivalence.</p> <p style="text-align: center;"><b>Knowing and using number facts</b></p> <p>Derive and recall multiplication facts for the 2,3,4,5,6 and 10 times tables and the corresponding division facts; recognise multiples of 2,5 or 10 up to 1000</p> <p><b>Calculating</b></p> <p>Multiply one digit and two digit numbers (e.g. <math>13 \times 3</math>, <math>50 \div 4</math>) round remainders up or down depending on the context</p> <p>Understand that division is the inverse of multiplication and vice versa, use this to derive and record related multiplication and division number sentences</p> <p>Understand that division is the inverse of multiplication and vice versa; use this to derive and record related multiplication and division number sentences</p> <p>Find unit fractions of numbers and quantities e.g. <math>\frac{1}{2}</math> <math>\frac{1}{3}</math> <math>\frac{1}{4}</math> and <math>\frac{1}{6}</math> of 12 litres</p>	<p>Use known facts to derive unknown facts</p> <p> <math>4 \times 6 = 24</math>  <math>6 \times 4 = 24</math>  <math>24 \div 4 = 6</math>  <math>24 \div 6 = 4</math> </p>  <p>Understand division as grouping: We have £12. Tickets cost £4. We can buy 3 tickets.</p>  <p>Solved by putting the coins into groups of 4.</p> <p>Understand division as sharing: We have £12. We share it equally between 4 friends. We get £3 each.</p>  <p>Solved by 'one for you, one for you' strategy or by finding half and half again.</p>	<p><math>24 \div 4 = 6</math></p>  <p><math>24 \div 6 = 4</math></p>  <p>Round up or down depending on the context:</p>  <p>Round up We have got £25. Tickets cost £4. <math>4 \times 6 = 24</math> We can buy 6 tickets we have not got enough money for 7.</p> <p>Round down 25 children are going camping. Each tent sleeps 4 children. <math>4 \times 6 = 24</math> We will need 7 tents.</p>

# Draft Policy

## Progression in calculation - Division

Year Group objectives	Models and images	Ways in which children might record
<p><b>Year 4</b>     <b>Counting and understanding number</b></p> <p>Recognise and continue number sequences formed by counting on or back in steps of constant size</p> <p>Use decimal notation for tenths and hundredths and partition decimals; relate the notation to money and measurement; position one-place and two-place decimals on a number line</p> <p>Recognise the equivalence between decimal and fraction forms of one half, quarters, tenths and hundredths</p> <p>Use diagrams to identify equivalent fractions e.g. <math>\frac{3}{4}</math> and <math>\frac{6}{8}</math> interpret mixed numbers and position them on a number line e.g. <math>3\frac{1}{2}</math></p> <p>Use the vocabulary of ratio and proportion to describe the relationship between two quantities e.g. There are two red beads to every 3 blue beads or 2 in every 5 beads are red. Estimate a proportion - about one quarter of the apples in the box are green</p> <p style="text-align: center;"><b>Knowing and using number facts</b></p> <p>Identify the doubles of two-digit numbers; use these to calculate doubles of multiples of 10 and 100 and derive the corresponding halves</p> <p>Derive and recall multiplication facts up to <math>10 \times 10</math>, the corresponding division facts and multiples of numbers up to 10 up to the tenth multiple</p> <p>Use knowledge of rounding, number operations and inverses to estimate and check calculations</p> <p>Identify pairs of fractions that total one</p> <p style="text-align: center;"><b>Calculating</b></p> <p>Multiply and divide numbers to 1000 by 10 and then 100 (whole number answers) understanding the effect, relate to scaling up or down</p> <p>Develop and use written methods to record, support and explain multiplication and division of two digit numbers by a one digit number including division and remainders (e.g. <math>15 \times 9</math>, <math>98 \div 6</math>)</p> <p>Find fractions of numbers, quantities or shapes e.g. <math>\frac{1}{3}</math> of plums</p> <p>Use a calculator to carry out one and two step calculations involving all four operations recognising negative numbers in the display, correct mistaken entries and interpret the display correctly in the context of money</p>	<p><math>72 \div 5 = 14</math> groups of 5 and 2 remaining</p>  <p>ITPs Grouping Remainders</p>	<p><math>72 \div 5</math></p>  <p>The answer is 14r2, because I can make 14 whole jumps of 5 and I have 2 left over.</p> <p>63 children are going camping. Each tent sleeps 4 children. How many tents are needed?</p>  <p>The answer is 16 tents. 15 tents would have 4 children in each and the last tent would have 3 children in it.</p>

