



# Great Wilbraham C of E Primary School

## 1. Introduction

This calculation policy aims to set out our clear expectations for the progression of calculation stages for each of the four operations. This calculation policy has been adapted from St John's Primary School, Cheltenham, Calculation Policy. It has been created through consultation with staff before being taken to the Full Governing Body.

## 2. Quality of Education

### 2.1. Intent of the Curriculum

#### 2.1.1. Curriculum design and coverage

Our curriculum intent for maths and calculation is:

- DIVERSITY – promotion of famous mathematicians every year in each class
- VALUES – supportive atmosphere with
- ASPIRE – seeing maths in everyday life and reasons to do well
- RESILIENT – positive attitude towards maths and consider different strategies
- THINK CRITICALLY – when problem solving
- ENGAGING – use of a variety of strategies and equipment

#### 2.1.2. Knowledge and skills

The policy lays out expectations for both mental and written calculations (generally collated for Key Stage 1), including calculation of fractions, and includes statements from the national curriculum and supplementary guidance as below:

- National Curriculum statutory statements - in bold
- National Curriculum non-statutory guidance - in italics
- Additional/Supplementary guidance - plain text
- Orange boxes provide teaching guidance and tips
- Speech bubbles denote examples either of key teacher questions or of children's thinking/ speaking.
- A vocabulary list is provided to encapsulate suggested vocabulary for each year group

#### 2.1.3. SEND

This policy guides schools in progression for each operation to ensure smooth transition. It is important that conceptual understanding, supported by the use of representations, is secure for procedures, and if at any point a pupil is struggling with a procedure, they should revert to concrete and/or pictorial resources and representations to solidify understanding.

### 2.2. Implementation of Teaching and Learning

#### 2.2.1. Subject knowledge

##### Representations

Key to successful implementation of a school calculation policy is consistent use of representations (models and images that support conceptual understanding of the mathematics) and this policy promotes a range of relevant representations, across the primary years.

Mathematical understanding is developed through use of representations that are first of all **concrete** (e.g. Numicon, Dienes apparatus), and then **pictorial** (e.g. Array, place value counters) to then facilitate **abstract** working (e.g. Columnar addition, long multiplication).

Whilst a mathematically fluent child will be able to choose the most appropriate representation and procedure to carry out a calculation, whether written or mental, schools should support pupils with carefully selected representations that underpin calculation methods (as detailed in this policy), and ensure there is consistency across year groups.

The 'Representations to support mental and written calculation' box on each page provides a range of models and images that underpin calculating in that year group. It is not an exhaustive collection and





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applies to both mental and written calculation in most circumstances. Additional specific examples are included inside mental and written calculation boxes.

## Progression in Calculation

The calculation policy promotes particular methods and procedures with particular representations alongside to support understanding of calculation. It is recommended that schools ensure consistency in both procedure and conceptual understanding to ensure fluency and confidence with written methods.

### 2.2.2. Leadership support

Regular learning walks, book scrutinies and monitoring of learning environments will be taken with feedback appropriately provided.

### 2.2.3. Resources

The school has a variety of concrete resources and planning resources such as Pearson ActiveLearn and White Rose Maths.

### 2.2.4. Learning environment

Examples of how calculations should be completed might be added to the maths working wall.

## 2.3. Impact

### 2.3.1. Summative assessment

Assessment will take place termly using the White Rose maths end of term materials. This must be to inform planning and to the development of children.

### 2.3.2. Applying learning

Opportunities to apply learning through reasoning and problem-solving activities are provided in addition to development of calculation skills.

## **3. Behaviour and Attitudes**

### 3.1. Attitudes to learning

Children are taught a variety of methods for recording their work and are encouraged and helped to use the most appropriate and convenient. Children are encouraged to use mental strategies and their own jottings before resorting to more formal written methods. Children's own jottings to support their work is encouraged throughout all year groups.

### 3.2. Positive and respectful culture

Staff and children will respect each others abilities in maths and aim to support each other to be the best they can be in a safe and supportive environment.

### 3.3. Supporting colleagues

Colleagues will be supported by the maths lead and provided with CPD or key ideas to develop their teaching.

## **4. Personal development**

### 4.1. Social, Moral, Spiritual, Cultural

Children will:

- Work together to solve problems
- Make responsible moral decisions and act on them, helping others
- Make an active contribution in maths sessions
- Understand, appreciate and contribute to a positive mindset culture

## **5. Leadership and management**

### 5.1. Continuing professional development

Staff needs in CPD in relation to calculations may come through performance management, recognition of a whole school need or through the needs of individual pupils.

### 5.2. Working with governors





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The maths coordinator links with a key governor who reports back to the Full Governing Body progress in maths teaching, learning and data.

## 5.3. Inclusion and equal opportunities

Positive attitudes towards mathematics are encouraged, so that all children, regardless of race, gender, ability or special needs, including those for whom English is a second language, develop an enjoyment and confidence with mathematics. This policy is in line with the school's 'Equality' policy. The aim is to ensure that everyone makes progress and gains positively from lessons and to plan inclusive lessons. Lessons involving lots of visual, aural and kinaesthetic elements will benefit all children including those for whom English is an additional language (EAL). Differentiated questions are used in lessons to help children and planned support from Teaching Assistants and other adults.

## 5.4. Reviewing and monitoring

This policy will be reviewed by the staff and maths leader every three years unless there is a change in maths curriculum.

## 6. **Links to other policies**

- 6.1. Maths Policy
- 6.2. Curriculum Policy
- 6.3. Assessment Policy
- 6.4. Feedback Policy
- 6.5. Special Needs Policy
- 6.6. Equalities Policy

## 7. **Appendices**

- 7.1. Calculation progression overview below

### **Wilbraham Way Expectations – calculations**

Planning – we have developed our own long term overview that suits our style of teaching, plans from Abacus and White Rose are used and combined as resources to aid learning

Curriculum – teachers ensure that tasks are appropriate to the children's needs but also to the level of their year group

Progression – children only progress when fully mastered the learning but the challenge is to enable all children to progress

Mastery – mastering the calculations and deepening learning is vital

Knowledge – all teachers will know the progression and where the children are moving towards and they must have a clear understanding of the progression of skills; this document aids this knowledge acquisition

Resources – children will learn from using concrete objects not just abstract calculations and every classroom has maths boxes full of a range of equipment





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## EYFS ADDITION

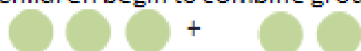
If available, Numicon shapes are introduced straight away and can be used to:

- identify 1 more/less
- combine pieces to add.
- find number bonds.
- add without counting.



Children can record this by printing or drawing around Numicon pieces.

Children begin to combine groups of objects using concrete apparatus



Construct number sentences verbally or using cards to go with practical activities.

Children are encouraged to read number sentences aloud in different ways

"Three add two equals 5" "5 is equal to three and two"

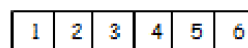
Children make a record in pictures, words or symbols of addition activities already carried out.

Solve simple problems using fingers



$$5 + 1 = 6$$

Number tracks can be introduced to count up on and to find one more:



What is 1 more than 4? 1 more than 13?

Number lines can then be used alongside number tracks and practical apparatus to solve addition calculations and word problems.



**Children will need opportunities to look at and talk about different models and images as they move between representations.**







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## Y1 ADDITION

Mental Calculations	<ul style="list-style-type: none"> <li>•Read, write and interpret mathematical statements using symbols +, -, =</li> <li>•Represent and use number bonds and related addition facts within 20</li> <li>•Add one digit and two-digit numbers up to 20, including zero.</li> <li>•Solve one-step problems using concrete objects and pictorial representations, and missing number problems such as <math>7 = \square - 9</math></li> <li>•Given a number, identify (and use the language) one more</li> </ul>
Written Calculations	<ul style="list-style-type: none"> <li>•Begin to compare (what's the same/different?) for commutative sums e.g <math>3 + 7 = 7 + 3</math></li> <li>•Memorise and reason with number bonds to 10 &amp; 20 in several forms</li> <li>•Add using objects, Numicon, cubes etc and number lines and tracks</li> <li>•Check with everyday objects</li> <li>•Ensure pre-calculation steps are understood, including:               <ul style="list-style-type: none"> <li>•Counting objects (including solving simple concrete problems)</li> <li>•Conservation of number:</li> <li>•Recognise place value in numbers beyond 20</li> <li>•Counting as reciting and as enumerating</li> </ul> </li> </ul> <div data-bbox="1161 674 1273 745" data-label="Image"> </div> <div data-bbox="1257 763 1441 880" data-label="Image"> </div> <div data-bbox="917 840 1141 898" data-label="Image"> </div>
Representations to support mental and written calculations.	<p>Use a range of concrete and pictorial representations, including:</p> <div data-bbox="264 974 496 1249" data-label="Image"> </div> <div data-bbox="624 1021 783 1200" data-label="Image"> </div> <div data-bbox="1177 1010 1461 1077" data-label="Image"> </div> <div data-bbox="1182 1122 1422 1234" data-label="Image"> </div> <div data-bbox="911 1189 1015 1290" data-label="Image"> </div> <div data-bbox="248 1317 555 1424" data-label="Image"> </div> <div data-bbox="659 1317 882 1417" data-label="Image"> </div> <div data-bbox="962 1317 1169 1379" data-label="Image"> </div> <div data-bbox="296 1447 480 1518" data-label="Image"> </div> <div data-bbox="272 1525 539 1559" data-label="Caption"> <p>Real everyday objects</p> </div> <div data-bbox="687 1429 839 1462" data-label="Caption"> <p>Bead strings</p> </div> <div data-bbox="962 1391 1153 1424" data-label="Caption"> <p>Number tracks</p> </div> <div data-bbox="1230 1205 1406 1238" data-label="Caption"> <p>Number lines</p> </div>
Links from other strands	<ul style="list-style-type: none"> <li>• Combine and increase numbers, counting forwards and backwards.</li> <li>• Develop the concept of addition and subtraction and ... use these operations flexibly.</li> <li>• Discuss and solve problems in familiar practical contexts, including using quantities</li> <li>• Compare, describe and solve practical [measure] problems e.g. longer, more than, heavier than</li> <li>• Problems terminology should include: put together, add, altogether, total, take away, distance between, difference between, more than and less than.</li> </ul>





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## Y2 ADDITION

Mental Calculations	<p>Add numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> <li>a two-digit number and ones</li> <li>a two-digit number and tens</li> <li>two two-digit numbers</li> <li>adding three one-digit numbers</li> </ul> <p>17 + 2 = 19    12 + 4 = 16 57 + 2 = 59    32 + 34 = 66</p>
Written Calculations	<ul style="list-style-type: none"> <li>Recall and use addition and subtraction facts to 20 facts fluently, and derive and use related facts up to 100</li> <li>Demonstrate the commutative law of addition</li> <li>Re-partition numbers eg.</li> <li>Use a hundred square</li> <li>Check calculations using inverse and by adding numbers in different order</li> <li>Using partitioning to separate tens and units, eg,</li> </ul> <p>54 = 50 + 4</p> <div data-bbox="901 577 1058 629"> <math>12 + 30 = 30 + 12</math>  <math>\square + 25 = 25 + 41</math> </div> <div data-bbox="1241 548 1358 689"> <math>65 = 60 + 5</math>  <math>65 = 50 + 15</math>  <math>65 = 40 + 25</math>  <math>65 = 30 + 35</math>  <math>65 = 20 + 45</math>  <math>65 = 10 + 55</math> </div>
Representations to support mental and written calculations.	<p>Use a range of concrete and pictorial representations, including:</p> <div data-bbox="252 947 483 1223"> </div> <div data-bbox="571 947 727 1122"> </div> <div data-bbox="927 947 1145 1043"> </div> <div data-bbox="1169 992 1433 1122"> </div> <div data-bbox="635 1133 930 1267"> </div> <div data-bbox="962 1122 1137 1305"> </div> <div data-bbox="1249 1155 1422 1189"> <p>Number lines</p> </div> <div data-bbox="1241 1227 1441 1290"> </div> <div data-bbox="379 1283 651 1384"> </div> <div data-bbox="707 1283 890 1357"> </div> <p>Real everyday objects</p>
Fractions	<p>Counting in fractions up to 10, starting from any numbers and using the 1/2 and 2/4 equivalence on the number line</p> <div data-bbox="1137 1536 1433 1581"> </div>
Links from other strands / bar modelling	<ul style="list-style-type: none"> <li>Solve problems:</li> <li>Using concrete objects, pictorial representations (numbers, quantities &amp; measures)</li> <li>Applying increasing knowledge of mental &amp; written methods</li> <li>Discuss and solve problems that emphasise the value of each digit in two-digit numbers</li> </ul> <p>(They should) develop the concept of addition and subtraction and ... use these operations flexibly. (Number-addition and subtraction, Non-statutory guidance.)</p>





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## Y3 ADDITION

Mental Calculations	<p><b>Add numbers mentally, including:</b></p> <ul style="list-style-type: none"> <li>a three-digit number and ones</li> <li>a three-digit number and tens</li> <li>a three digit number and hundreds</li> <li>Partition all numbers and recombine, start with TU + TU then HTU + TU</li> <li>Use hundred square, place value counters, number lines</li> </ul>	<p><b>Common mental calculation strategies:</b></p> <p>Partitioning and recombining  Doubles and near doubles  Use number pairs to 10 and 100  Adding near multiples of ten and adjusting  Using patterns of similar calculations  Using known number facts  Bridging though ten, hundred</p>
Written Calculations	<p><b>Add numbers with up to three digits, using formal written (columnar) methods</b></p> <p>Add to three digit numbers using physical and abstract representations;</p> <ul style="list-style-type: none"> <li>dienes, place value counters, empty number lines</li> </ul> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px;"> <math display="block">\begin{array}{r} 30 + 4 \\ 20 + 5 \\ 50 + 9 \end{array} \rightarrow \begin{array}{r} 34 \\ +25 \\ 59 \end{array}</math> </div> <div style="border: 1px solid black; padding: 5px;"> <math display="block">\begin{array}{r} 200 + 30 + 4 \\ 500 + 20 + 7 \\ 700 + 60 + 1 \\ 10 \end{array} \rightarrow \begin{array}{r} 234 \\ + 527 \\ 761 \\ 1 \end{array}</math> </div> </div> <p style="background-color: orange; text-align: center; padding: 5px;"><b>Revert to concrete representations if children find expanded/column methods difficult</b></p>	
Representations to support mental and written calculations.	<p>Use a range of concrete, pictorial and abstract representations, including those below</p> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 30%;"> <p><b>Bundles of straws</b></p> <p>42 + 31 = 73</p> </div> <div style="width: 30%;"> <p>0 + 50 + 3  10 + 40 + 3  20 + 30 + 3  30 + 20 + 3  40 + 10 + 3  50 + 0 + 3</p> </div> <div style="width: 30%;"> <p>160 + 280</p> </div> </div> <div style="border: 1px solid black; padding: 10px; margin-top: 10px; width: fit-content;"> <p>76 + 21  = 70 + 6 + 20 + 1  = 90 + 7 = 97</p> </div> <p style="text-align: center; margin-top: 10px;">What is the same and what is different about all these methods?</p> <div style="text-align: right; margin-top: 10px;"> <p style="border: 1px solid green; border-radius: 50%; padding: 10px; display: inline-block;">I can explain my method using representations</p> </div> <div style="text-align: right; margin-top: 10px;"> <p>Dienes and place value counters</p> </div> <p style="text-align: left; margin-top: 10px;">Partitioning and recombining</p>	
Fractions	<p>Addition of fractions with the same denominator within one whole.</p>	<p>Addition of fractions with the same denominator</p> <div style="display: flex; align-items: center;"> <math display="block">\frac{2}{5} + \frac{3}{5} = \frac{5}{5}</math> </div>
Links from other strands / bar modelling	<p>Pupils should estimate the answers to a calculation &amp; use inverse operations to check answers.</p> <p>Add amounts of money using both £ and p in practical contexts.</p> <p>Measure, compare and add lengths (m/cm/mm), mass (kg/g) &amp; volume/capacity (l/ml)</p> <p>Use bar modelling to solve word problems - including missing number problems, using number facts, place value, and more complex addition</p>	







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## Y4 ADDITION

Informal methods to support mental Calculations	<p>Practise mental methods with increasingly large numbers</p> <p>Consolidate partitioning and re-partitioning</p> <p>Use compensation for adding too much/little and adjusting</p> <p>Use Dienes, place value counters, empty number lines etc.</p> <div><div>I know that <math>63 + 29</math> is the same as <math>63 + 30 - 1</math></div><div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> 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# Great Wilbraham C of E Primary School

## Y5 ADDITION

Informal methods to support mental Calculations	<ul style="list-style-type: none"> <li>• Add numbers mentally with increasingly large numbers, e.g. <math>12\,462 + 2300 = 14\,762</math></li> <li>• Mentally add tenths, and one-digit numbers and tenths</li> <li>• Add decimals, including a mix of whole numbers and decimals, decimals with different numbers of places, and complements of 1 (e.g. <math>0.83 + 0.17 = 1</math>)</li> </ul> <p>Children use representation of choice</p> <p>Refer back to pictorial and physical representations when needed</p> <div data-bbox="1027 412 1469 696"> <p><b>Common mental calculations</b></p> <p>Doubles and near doubles</p> <p>Adding near multiples of 10</p> <p>Using patterns of similar calculations</p> <p>Bridging though ten, hundred, tenth</p> </div>
Written Calculations	<p><b>Add whole numbers with more than four digits, using the formal written (columnar) method</b></p> <p>Add three digit numbers using columnar method and then move onto 4 digits.</p> <p>Include decimal addition for money</p> <div data-bbox="1050 860 1209 1010"> <math display="block">\begin{array}{r} 24172\text{m} \\ + 5929\text{m} \\ \hline 30101\text{m} \\ 1111 \end{array}</math> </div> <div data-bbox="1315 819 1498 987"> <math display="block">\begin{array}{r} £563.14 \\ + £207.88 \\ \hline £771.02 \\ 111 \end{array}</math> </div> <p><b>Revert to expanded methods if children find formal calculation method difficult (see Y3)</b></p>
Representations to support mental and written	<p><b>Use physical/pictorial representations alongside columnar methods where needed.</b></p> <p><math>12\,462 + 2300</math>  <math>= 12\,462 + 2000 + 300</math>  <math>= 14\,462 + 300</math>  <math>= 14\,762</math></p> <p>Partitioning and recombining</p> <div data-bbox="507 1160 906 1451"> <p>Ask <b>what is the same</b> and <b>what is different</b> about all these methods?</p> <p>Jottings to support mental calculation</p> </div> <div data-bbox="1107 1182 1485 1375"> <p>Place Value counters to support column addition</p> </div>
Fractions	<ul style="list-style-type: none"> <li>• Add fractions with the same denominator and denominators that are multiples of the same number (to become fluent through a variety of increasingly complex problems and add fractions that exceed 1 as a mixed number)</li> </ul> <div data-bbox="252 1592 448 1682"> </div> <p>Add</p> <div data-bbox="571 1592 767 1682"> </div> <div data-bbox="879 1585 1082 1675"> <math display="block">\frac{1}{2} + \frac{3}{4} = \frac{2}{4} + \frac{3}{4} = \frac{5}{4}</math> </div> <div data-bbox="1337 1496 1485 1675"> <p><math>\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{4}{4} = 1</math></p> </div>
Links from other strands / bar modelling	<ul style="list-style-type: none"> <li>• Solve problems involving up to three decimal numbers.</li> <li>• Solve addition and subtraction multi step problems in context, deciding which operations and methods to use and why</li> <li>• Use all four operations to solve problems involving measure [e.g. length, mass, volume, money] using decimal notation,</li> <li>• Calculate the perimeter of composite rectilinear squares in centimetres and metres</li> <li>• Use angle sum facts and other properties to make deductions about missing angles</li> <li>• Solve comparison, sum and difference problems using information presented in a line graph</li> </ul>





# Great Wilbraham C of E Primary School

## Y6 ADDITION

Informal methods to support mental Calculations	<ul style="list-style-type: none"> <li>• Perform mental calculations, including with mixed operations and large numbers (<i>more complex calculations</i>)</li> </ul> <p>Children use representation of choice Consolidate partitioning and re-partitioning</p> <p>Use compensation for adding too much/little and adjusting Refer back to pictorial and physical representations when needed.</p> <p><b>Common mental calculation strategies:</b> Partitioning and recombining Doubles and near doubles Use number pairs to 10 and 100 Adding near multiples of ten and adjusting Using patterns of similar calculations Using known number facts Bridging though ten, hundred, tenth Complementary addition</p>
Written Calculations	<p><b>Add larger numbers using the formal written (columnar) method</b></p> <p>Add three digit numbers using columnar method and then move onto 4 digits. Include decimal addition for money</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: right;"> <math display="block">\begin{array}{r} £563.14 \\ + £207.88 \\ \hline £771.02 \\ \hline 111 \end{array}</math> </div> <div style="text-align: right;"> <p>789 + 642 becomes</p> <math display="block">\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ \hline 111 \end{array}</math> <p>Answer: 1431</p> </div> </div> <p style="background-color: orange; padding: 5px; text-align: center;"><b>Revert to expanded methods if children find formal calculation method difficult (see Y3)</b></p>
Representations to support mental and written	<p><b>Use physical/pictorial representations alongside columnar methods where needed. Ask what is the same and what is different?</b></p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; width: 20%;"> <math display="block">\begin{array}{l} 12\,462 + 2300 \\ = 12\,462 + 2000 + 300 \\ = 14\,462 + 300 \\ = 14\,762 \end{array}</math> <p>Partitioning and recombining</p> </div> <div style="text-align: center;"> </div> <div style="border: 1px solid black; padding: 5px; width: 20%;"> <math display="block">\begin{array}{l} 234\text{ kg} + 49\text{ kg} = 273\text{ kg} \\ 200 + 30 + 4 \\ 40 + 9 \\ 200 + 70 + 13 \end{array}</math> </div> <div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: 20%; text-align: center;"> <p>I can explain my method using place value counters</p> </div> </div> <div style="text-align: center; margin-top: 20px;"> <p>What is the same and what is different about all these methods?</p> </div> <div style="text-align: right; margin-top: 20px;"> <p>Place Value counters to support column addition</p> </div>
Fractions	<ul style="list-style-type: none"> <li>• Add fractions with different denominators and mixed numbers, using the concept of equivalent fractions</li> <li>• Start with fractions where the denominator of one fraction is a multiple of the other (e.g. <math>\frac{1}{2} + \frac{1}{8} = \frac{5}{8}</math>) and progress to varied and increasingly complex problems</li> <li>• Practise calculations with simple fractions and decimal equivalents to aid fluency</li> </ul>
Links from other strands / bar modelling	<ul style="list-style-type: none"> <li>• Use their knowledge of the order of operations to carry out calculations involving the four operations (BIDMAS)</li> <li>• Solve problems involving all four operations</li> <li>• Algebra: use symbols and letters to represent variable and unknowns e.g. <math>a + b = b + a</math></li> <li>• Solve problems involving the calculation and conversions of units of measure, using decimal notation of up to three decimal places where appropriate</li> <li>• Using the number line, pupils use, add and subtract positive and negative integers for measures such as temperature</li> <li>• Calculate and interpret the mean as an average</li> <li>• Interpret and construct pie charts and line graphs and use these to solve problems</li> <li>• Find missing angles, and express geometry relationships algebraically (e.g. <math>d=2xr</math>)</li> </ul>





## EYFS SUBTRACTION

Children begin with mostly pictorial representations

x x x

x x

Concrete apparatus is used to relate subtraction to taking away and counting how many objects are left.

Concrete apparatus models the subtraction of 2 objects from a set of 5.

● ● ● ● ✕  
 $5 - 1 = 4$

Construct number sentences verbally or using cards to go with practical activities.

Children are encouraged to read number sentences aloud in different ways "five subtract one leaves four" "four is equal to five subtract one"

Children make a record in pictures, words or symbols of subtraction activities already carried out.

Solve simple problems using fingers

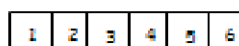


$$5 - 1$$



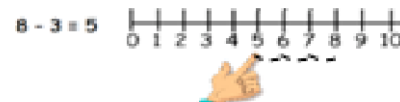
$$= 4$$

Number tracks can be introduced to count back and to find one less:



What is 1 less than 9? 1 less than 20?

Number lines can then be used alongside number tracks and practical apparatus to solve subtraction calculations and word problems. Children count back under the number line.






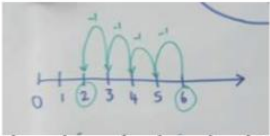
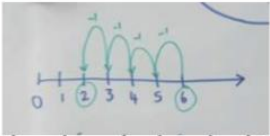

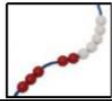
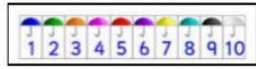

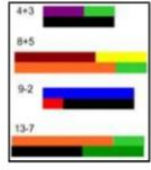

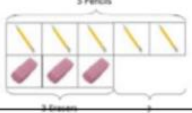
Children will need opportunities to look at and talk about different models and images as they move between representations.







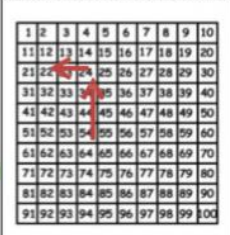
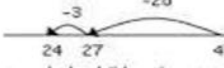
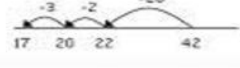
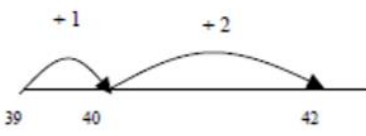




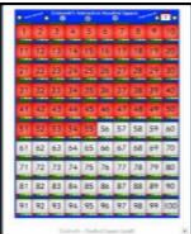
## Y1 SUBTRACTION

Mental Calculations	<p>Subtract one digit and two-digit numbers to 20, including zero.  Read, write and interpret mathematical statements using symbols (+, -, =) signs.  Represent and use number bonds and related addition facts within 20  Solve one-step problems using concrete objects and pictorial representations, and missing number problems such as <math>7 = \square - 9</math>  Memorise and reason with number bonds  Add using objects, Numicon, cubes etc and number lines and tracks  Check with everyday objects  Ensure pre-calculation steps are understood, including:  Counting objects,</p>  <p>Conservation of number</p>  <p>1 2 3</p> <p>Understand subtraction as 'take away'</p>  <p>Find a 'difference' by counting up:</p>	
Written Calculations	<p>Subtract one-digit and two-digit numbers to 20, including zero.</p> <p><math>7 - 3 = \square</math>, <math>7 - \square = 4</math>  <math>\square - 3 = 4</math>, <math>17 - 13 = \square</math>  <math>17 - \square = 4</math></p>  <p>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs .</p> <p>What's the difference between 4 and 6?</p> <p>Represent and use number bonds and related subtraction facts within 20.</p> 	
Representations to support mental and written calculations.	<p>Use a range of concrete and pictorial representations, including:</p>  <p>Hands, and children themselves.</p>  <p>Bead strings, number tracks and lines</p>     <p>Subtraction: Comparison Model</p> <p>Peter has 5 pencils and 3 erasers. How many more pencils than erasers does he have?</p> 	
Fractions	<p>Counting in fractions to 1</p> <p><math>\frac{1}{2} + \frac{1}{2} = 1</math> or <math>\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1</math> or <math>\frac{1}{4} + \frac{1}{4} + \frac{1}{2} = 1</math></p>	
Links from other strands / bar modelling	<p>Pupils should combine and increase numbers, counting forwards and backwards.  <i>(They should) develop the concept of addition and subtraction and ... use these operations flexibly. Problems should include the terms: put together, add, altogether, total, take away, distance between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.</i>  <i>(Number-addition and subtraction, Non-statutory guidance.)</i>  Pupils discuss and solve problems in familiar practical contexts . <i>(Non-statutory guidance.)</i>  Pupils compare, describe and solve practical (measurement) problems .  <i>(Measurement)</i></p>	







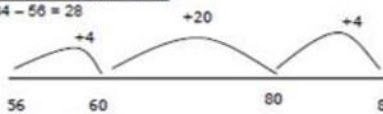
## Y2 SUBTRACTION

<p>Mental Calculations</p>	<p>Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> <li>• a two-digit number and ones</li> <li>• a two-digit number and tens</li> <li>• two two-digit numbers</li> <li>• adding three one-digit numbers</li> </ul> <p>Jottings to support informal methods:</p> <p>• Subtracting the tens in one jump and the units in one jump.</p> <p><math>54 - 32 = 22</math></p> 
<p>Written Calculations</p>	<p>• Bridging through ten can help children become more efficient.</p> <p><math>47 - 23 = 24</math></p>  <p><math>42 - 25 = 17</math></p>  <p>• = signs and missing numbers</p> <p>Continue using a range of equations as in Year 1 but with appropriate numbers. Extend to <math>14 + 5 = 20 - \square</math> Find a small difference by counting up <math>42 - 39 = 3</math></p> 
<p>Representations to support mental and written calculations.</p>	<p><u>Informal methods to support written subtraction calculations</u></p> <p>Practical portioning of a 2-digit number</p> <p>In Year 1 leads to:</p>  <p>Which line has most money? How much more?</p> <p>Bundles of straws or dienes to represent and partition 2 digit numbers. Subtract (without decomposition) using partitioning and equipment, e.g.</p>  <p>To calculate <math>35 - 22</math>, remove 22.</p>  <p>Then record: <math>35 - 22 = 13</math>.</p> <p>Continue to use of a range of concrete and pictorial representations from Year 1—including Bar model to support understanding of <b>difference</b>. (See below.)</p>
<p>Fractions</p>	<p>Pupils should count in fractions up to 10, starting from any number and using the equivalence on the number line (for example, <math>1\frac{1}{4}</math>, <math>1\frac{1}{2}</math>, <math>1\frac{3}{4}</math>, 2.)</p> <p>Use concrete and pictorial models of fractions to assist with counting e.g. paper cups, plates, shapes etc.</p> 
<p>Links from other strands / bar modelling</p>	<p><b>Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.</b> <b>Pupils should partition to support subtraction.</b></p>  <p><math>55 + 45 = 100</math> <math>45 + 55 = 100</math> <math>35 + 65 = 100</math> <math>100 - 55 = 45</math> <math>100 - 45 = 55</math> <math>100 - 35 = 65</math></p> <p><b>Solve problems with addition and subtraction:</b></p> <ul style="list-style-type: none"> <li>• using concrete objects and pictorial representations, involving numbers, quantities and measures</li> <li>• applying knowledge of mental and written methods</li> <li>• Pupils extend their understanding of the language of addition and subtraction to include sum and difference.</li> </ul>





## Y3 SUBTRACTION

Mental Calculations	<p>Add and subtract numbers mentally, including:</p> <ul style="list-style-type: none"> <li>*a three-digit number and ones</li> <li>*a three-digit number and tens</li> <li>*a three-digit number and hundreds.</li> </ul> <p>Use a number line, dienes, hundred squares, two-hundred squares, and similar representations, to support mental calculations. (See Representations section below.)</p>  <div data-bbox="948 300 1410 763"> <p><u>Use known number facts and place value to subtract</u> Continue as in Year 2 but with appropriate numbers e.g. <math>97 - 15 = 72</math></p>  <p>With practice, children will need to record less information and decide whether to count back or forward. It is useful to ask children whether counting up or back is the more efficient for calculations such as <math>57 - 12</math>, <math>86 - 77</math> or <math>43 - 28</math>.</p> <p><u>Pencil and paper procedures</u> <u>Complementary addition</u> <math>84 - 56 = 28</math></p>  </div>
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# Great Wilbraham C of E Primary School

## Y4 SUBTRACTION

Mental Calculations	<p><b>Continue to practise mental methods with increasingly large numbers to aid fluency.</b> (From Non-Statutory Guidance).</p> <p>Methods to support fluent calculation and encourage efficiency of method:</p> <ul style="list-style-type: none"> <li>Find a small difference by counting up. E.g. 5003—4996</li> <li>Subtract nearest multiple of ten and adjust.</li> <li>Partition larger numbers</li> </ul> <p>Whenever possible, children should be encouraged to visualise number lines and other basic, supporting representations to promote fluent work with- out jottings.</p> <p>This could be done using an empty number line. Children should recall and use number facts to reduce the number of steps.</p> <p>Use known number facts and place value to subtract  <math>92 - 25 = 67</math></p>
Written Calculations	<p><b>Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.</b></p> <p>Build on formal, extended method (See Year 3) using exchange wherever necessary. Continue to use representations and manipulatives to develop understanding of place value.</p> <p>Moving to compact methods</p> <p>372—147 =</p> <p> <math>300 + 70 + 2</math>  <math>-100 + 40 + 7</math> </p> <p>→</p> <p> <math>300 + 60 + 12</math>  <math>-100 + 40 + 7</math>  <math>200 + 20 + 5</math> </p> <p>→</p> <p> <math>300 + 70 + 2</math>  <math>-100 + 40 + 7</math>  <math>200 + 20 + 5</math> </p> <p>Apply understanding of subtraction with larger integers to that of decimals in context of money and measures. (See Year 5.)</p>
Representations to support mental and written calculations.	<p>Dienes blocks or place value counters can be used to model calculations and the under-lying place value concepts.</p> <p>This is now "Sixty-twelve"</p> <p>Use physical and / or pictorial representations and expanded algorithms alongside columnar methods. Ask: <i>What is the same? What's different?</i> Compare and discuss the suitability of different methods in context. Pupils <b>decide which operations and methods to use and why.</b></p> <p>I would count on using a numberline to calculate 5003-4896 because the numbers are close together.</p>
Fractions	<p>Count up and down in hundredths. Add and subtract fractions with the same denominator. Solve simple measure and money problems involving fractions and decimals to two decimal places.</p>
Links from other strands / bar modelling	<p><b>Identify, represent and estimate numbers using different representations. (Place value)</b></p> <p><b>Recognise the place value of each digit in a four-digit number.</b></p> <p><b>Estimate and use inverse operations to check answers to a calculation .</b></p> <p><b>Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.</b></p> <p><b>Estimate, compare and calculate different measures, including money in pounds and pence.</b></p>





## Y5 SUBTRACTION

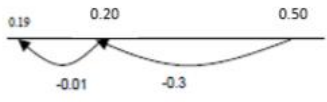
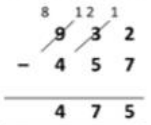
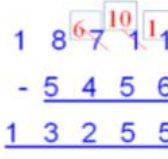
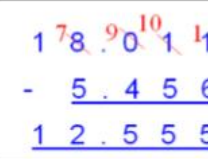
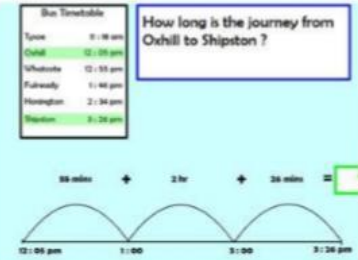
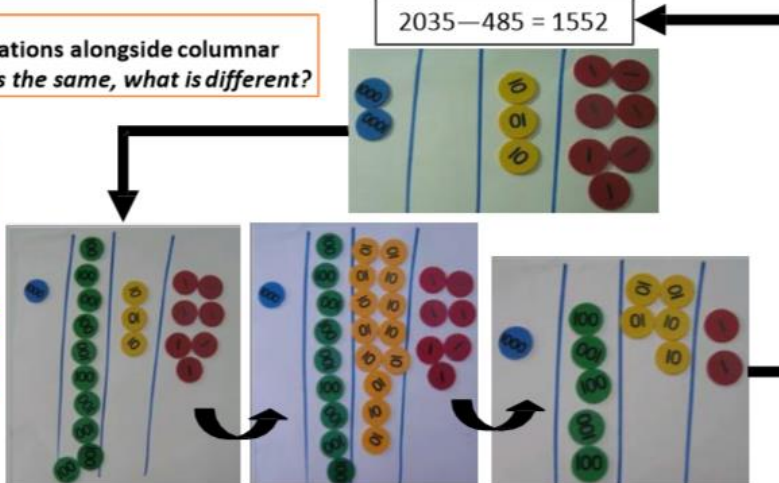
Mental Calculations	<ul style="list-style-type: none"> <li>Subtract numbers mentally with large numbers E.g. <math>12\ 462 - 2300 = 10\ 162</math></li> <li>Use rounding to check answers to calculations in the context of a problem. <i>Pupils practise adding and subtracting decimals including a mix of whole numbers and decimals with different numbers of place values and complements to 1 (for example, <math>1 - 0.17 = 0.83</math>).</i></li> <li>Pupils mentally add and subtract tenths, and one-digit whole numbers and tenths.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">             Find difference by counting up              Partitioning              Applying known facts              Bridging through 10 and multiples of 10              Subtracting 9, 11 etc by compensating           </div> <div style="border: 1px solid black; border-radius: 50%; width: 100px; height: 100px; display: flex; align-items: center; justify-content: center; margin-top: 10px;">             Which method works best?           </div> <div style="background-color: orange; padding: 5px; margin-top: 10px;">             Children use, or visualise, representation of choice. Refer back to physical representations as required.           </div>
Written Calculations	<p>Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).  <i>(Pupils) practise adding and subtracting decimals.</i>              Begin with three-digit numbers using formal, columnar method; then move into four-digit numbers.</p> <div style="background-color: orange; padding: 5px; margin-top: 10px;">             As in Year 4, compare physical and / or pictorial representations and expanded algorithms alongside columnar methods. Ask: <i>What is the same? What's different?</i>              Compare and discuss the suitability of different methods, (mental or written), in context.              Revert to expanded methods whenever difficulties arise           </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> <math>£17.34 - £12.16</math> </div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; background-color: #e0e0ff;">             What is the same about these models?              What's different?           </div> </div> <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="text-align: right; margin-right: 10px;"> <math>1000+700+20+14p</math>  <math>-1000+200+10+6p</math>  <hr style="width: 100px; border: 0.5px solid black;"/> <math>500+10+8p</math> </div> <div style="background-color: yellow; padding: 5px; margin-right: 10px; text-align: center;"> <math>\begin{array}{r} 1734p \\ -1216p \\ \hline 518p \end{array}</math> </div> <div style="text-align: left;"> <math>\begin{array}{r} £\ 17.34 \\ -12.16 \\ \hline 5.18 \end{array}</math> </div> </div> <div style="border: 1px solid orange; padding: 5px; margin-top: 10px;">             Relate place value of decimals with that of whole numbers using representations. See below.           </div> </div>
Representations to support mental and written calculations.	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 10px; margin-right: 10px;"> </div> <div> <p>Integers ←</p> <p>Money ←</p> <p>Decimals ←</p> </div> </div> <div style="margin-top: 10px;"> </div> <div style="border: 1px solid orange; padding: 5px; margin-top: 10px;">             Use physical and pictorial representations to stress the place value relationships between money, decimals and whole numbers. A place value mat such as this one could be used, moving away from the traditional: <i>Hundreds, tens and ones</i> model used in Lower KS2 and KS1.           </div>
Fractions	<p>Subtract fractions with the same denominator and denominators that are multiples of the same number. <i>(Include fractions exceeding 1 as a mixed number.)</i>              Solve problems involving number up to three decimal places.              They mentally add and subtract tenths, and one-digit whole numbers and tenths.</p>
Links from other strands/ bar modelling	<p>Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign.              Use all four operations to solve problems involving time, money and measure using decimal notation.; (up to 3d.p.)</p>





# Great Wilbraham C of E Primary School

## Y6 SUBTRACTION

Mental Calculations	<p><b>Children:</b></p> <ul style="list-style-type: none"> <li>Perform mental calculations, including with mixed operations and large numbers.</li> <li>Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.</li> <li><i>They undertake mental calculations with increasingly large numbers and more complex calculations.</i></li> </ul> <p>Use known number facts and place value to subtract  <math>0.5 - 0.31 = 0.19</math></p>  <p>Children draw on basic, Mental subtraction Strategies, (See Year 5.)          Children use, or visualise, representation of choice.          Refer back to physical representations as required.</p>
Written Calculations	<p>Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction). Solve problems involving the calculation and conversions of units of measure, using decimal notation of up to three decimal places where appropriate. (MEASURES)</p> <p>Move towards consolidation of formal, columnar method.          For more complex calculations, with increasingly larger or smaller numbers, compare representations and expanded algorithms alongside columnar methods. Ask: What is the same? What's different?          Compare and discuss the suitability of different methods, (mental or written), in context.          Revert to expanded methods whenever difficulties arise</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="284 969 451 1126"> <p>932 - 457 becomes</p>  </div> <div data-bbox="523 969 778 1126"> <p>Consolidate columnar methods, paying particular attention to the occurrence of zeros as place holders.</p> </div> <div data-bbox="890 969 1074 1126">  </div> <div data-bbox="1201 969 1425 1126">  </div> </div>
Representations to support mental and written calculations.	<p>Use physical/pictorial representations alongside columnar methods where needed. <i>What is the same, what is different?</i></p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="276 1294 635 1552">  </div> <div data-bbox="643 1160 1425 1641"> <p>2035 - 485 = 1552</p>  </div> </div>
Fractions	<p>Add and subtract fractions with different denominators and mixed numbers.  <i>They practise calculations with simple fractions and decimal fraction equivalents to aid fluency.</i></p>
Links from other strands / bar modelling	<p>Use their knowledge of the order of operations to carry out calculations involving the four operations (BODMAS)          Solve problems involving all four operations          Algebra: use symbols and letters to represent variable and unknowns e.g. <math>a + b = b + a</math>          Using the number line, pupils use, add and subtract positive and negative integers for measures such as temperature.</p>







## EYFS MULTIPLICATION

The link between addition and multiplication can be introduced through doubling.

If available, Numicon is used to visualise the repeated adding of the same number. These can then be drawn around or printed as a way of recording.

Children begin with mostly pictorial representations:



How many groups of 2 are there?

Real life contexts and use of practical equipment to count in repeated groups of the same size:



How many wheels are there altogether?



How much money do I have?

Count in twos; fives; tens both aloud and with



objects

Children are given multiplication problems set in a real life context. Children are encouraged to visualise the problem.

How many fingers on two hands? How many sides on three triangles? How many legs on four ducks?

Children are encouraged to read number sentences aloud in different ways "five times two makes ten" "ten is equal to five multiplied by two"







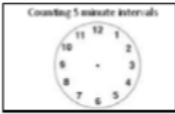
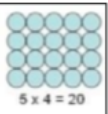
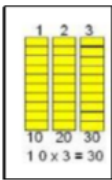
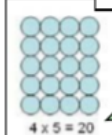
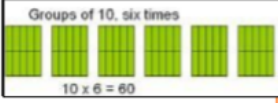

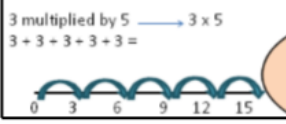
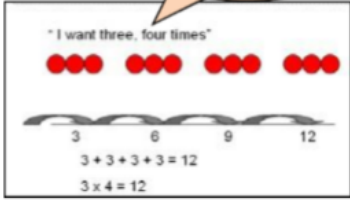
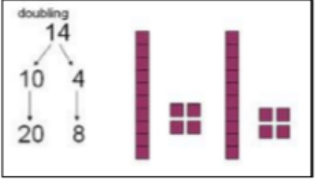
## Y1 MULTIPLICATION

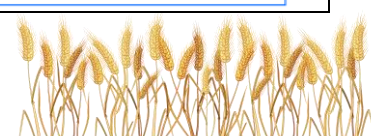
Mental Calculations	<ul style="list-style-type: none"> <li>• <b>solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.</b></li> <li>• <b>Count in multiples of twos, fives and tens</b> with equipment, songs &amp; rhythms, and including by rote               <ul style="list-style-type: none"> <li>• Counting 2s e.g. counting socks, shoes, animal legs...</li> <li>• Counting in 5s e.g. counting fingers, fingers in gloves, toes ...</li> <li>• Counting in 10s e.g. counting fingers, toes ...</li> </ul> </li> <li>• Doubles up to 10</li> <li>• Recognising odd and even numbers</li> <li>• Write as a number pattern (e.g. 5, 10, 15...; 2, 4, 6...; 10, 20, 30...)</li> </ul>
Written Calculations	<div data-bbox="272 633 668 835"> <p>It is important to use a range of models to develop understanding of multiplication, and that children make connections between arrays, number patterns, and counting in twos, fives and tens</p> </div> <div data-bbox="746 633 1236 835"> <p>Although there is no statutory requirement for written multiplication in Year 1, it may be helpful to encourage children to begin to write it as a repeated addition sentence in preparation for Year 2 E.g. <math>2 + 2 + 2 + 2 = 8</math> or <math>4 \times 2 = 8</math></p> </div> <div data-bbox="1118 421 1426 685"> <p>What's the sequence?</p> <p>What comes next?</p> </div>
Representations to support mental and written calculations.	<p>Use a range of concrete and pictorial representations, including:</p> <div data-bbox="268 913 750 1041"> <p>There are 3 sweets in one bag. How many sweets are there in 5 bags?</p> </div> <div data-bbox="767 913 967 1095"> <p>4 groups of 3 3 groups of 4</p> </div> <div data-bbox="1091 913 1422 1196"> <p>Lots of the 'same thing'</p> <p>Bead Bar</p> <p>Number Line</p> <p>Fingers</p> </div> <div data-bbox="268 1064 702 1218"> <p>2 groups of 5 (5 x 2) using Numicon</p> </div> <div data-bbox="268 1218 461 1337"> </div> <div data-bbox="509 1234 673 1447"> <p>"2 strawberries 3 times" <math>2 \times 3 = 6</math> <math>2 + 2 + 2 = 6</math></p> </div> <div data-bbox="687 1245 986 1382"> <p>4 groups of 2p 2p multiplied by 4 <math>2p \times 4 = 8p</math></p> </div> <div data-bbox="1227 1218 1415 1498"> <p><math>3 + 3 + 3 + 3 = 12</math> 3 multiplied by 4 is 12 <math>3 \times 4 = 12</math></p> </div> <div data-bbox="268 1462 595 1606"> <p><math>4 \times 3 = 12</math> "4 cakes, 3 times" 4 multiplied by 3</p> </div> <div data-bbox="711 1435 994 1606"> <p>Double 4 in hoops</p> </div> <div data-bbox="1227 1514 1386 1615"> <p>5 10</p> </div>
Links from other strands / bar modelling	<ul style="list-style-type: none"> <li>• <b>Count in multiples of twos, fives and tens (from Number and place value), as above</b></li> <li>• <i>Counting in twos, five and tens from different multiples to develop their recognition of patterns in the number system</i></li> <li>• <i>They discuss and solve problems in familiar practical contexts, including using quantities.</i></li> <li>• Using bar modelling to solve simple problems – how many sweets in 5 bags?</li> </ul>





## Y2 MULTIPLICATION

Mental Calculations	<ul style="list-style-type: none"> <li>Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, <i>connecting the 2, 5 and 10 multiplication tables to each other</i></li> <li>Connect the 10 multiplication table to place value</li> <li>Recognise odd and even numbers</li> <li>show that multiplication of two numbers can be done in any order (commutative)</li> <li>Use a variety of language to describe multiplication and division</li> <li>Apply doubling of numbers up to ten to doubling larger numbers</li> <li>Counting in 3s – odd / even pattern</li> </ul> <div data-bbox="1093 427 1401 544" style="background-color: #90EE90; padding: 5px;"> <p>I know that the multiples of 2/5/10 are always / never ....</p> </div>
Written Calculations	<ul style="list-style-type: none"> <li>calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (<math>\times</math>), division (<math>\div</math>) and equals (=) signs</li> <li>Begin to use other multiplication tables and recall facts to perform written calculations</li> <li>Use a range of materials and contexts ... including arrays and repeated addition</li> </ul> <div data-bbox="1310 741 1433 880" style="border: 1px solid black; padding: 5px;"> <math>7 \times 2 = \square</math>  <math>7 \times \square = 14</math>  <math>\square \times 2 = 14</math>  <math>\triangle \times \square = 14</math> </div>
Representations to support mental and written calculations.	<p>Use a range of concrete and pictorial representations, including:</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;">  <p>Counting 5 minute intervals</p> </div> <div style="width: 50%;">  <p><math>5 \times 4 = 20</math></p> </div> <div style="width: 50%;">  <p><math>10 \times 3 = 30</math></p> </div> <div style="width: 50%;">  <p><math>4 \times 5 = 20</math></p> </div> <div style="width: 50%;">  <p>Groups of 10, six times <math>10 \times 6 = 60</math></p> </div> <div style="width: 50%;">  <p>5 10 15 Counting tally marks to support counting in 5s.</p> </div> <div style="width: 50%;">  <p>3 multiplied by 5 <math>3 + 3 + 3 + 3 + 3 =</math></p> </div> <div style="width: 50%;">  <p>"I want three, four times" <math>3 + 3 + 3 + 3 = 12</math> <math>3 \times 4 = 12</math></p> </div> <div style="width: 50%;">  <p>doubling 14 <math>10 + 4 = 14</math> <math>20 + 8 = 28</math></p> </div> </div> <div style="margin-top: 20px;"> <p><b>What arrays can you make with 20 counters?</b></p> <p><b>I want five, four times</b></p> <p><b>I want four, five times</b></p> <p><b>What do you notice about the numbers covered up? Is there a pattern? What number is next?</b></p> <div style="border: 2px solid orange; padding: 10px; margin-top: 10px;"> <math>10 + 10 = 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2</math>  <math>5 + 5 + 5 + 5 = 4 + 4 + 4 + 4 + 4</math> </div> </div>
Fractions	<ul style="list-style-type: none"> <li>write simple fractions for example, <math>1/2</math> of <math>6 = 3</math> and recognise the equivalence of <math>2/4</math> and <math>1/2</math></li> <li>Begin to relate multiplication and division models to fractions and measures</li> </ul>
Links from other strands / bar modelling	<ul style="list-style-type: none"> <li>solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.</li> <li>Use commutativity and inverse relations to develop multiplicative reasoning (e.g. <math>4 \times 5 = 20</math> and <math>20 \div 5 = 4</math>)</li> <li>Statistics—interpret and construct simple pictograms, tally charts and block diagrams</li> <li>Measurement— counting 5 minute intervals on a clockface</li> <li>Place value count in steps of 2, 3 and 5 from 0 and in tens from any number, forwards and backwards</li> </ul>







## Y3 MULTIPLICATION

### Mental Calculations

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (and 2, 5 and 10 multiplication tables from Y2)
- Use doubling to connect 2, 4 and 8 multiplication tables
- Develop efficient mental methods using commutativity and associativity
- Derive related multiplication and division facts
- calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental methods
- Partitioning: multiply the tens first and then multiply the units, e.g.  $57 \times 6 = (50 \times 6) + (7 \times 6) = 300 + 42 = 342$
- Children can apply these skills to solve spoken word problems too,
- Include missing number statements e.g.  $72 \div \square = 8$

Ensure opportunities to learn multiplication tables through use of visual models, images and also rote learning.

Multiplication and division facts:

$$8 \times 4 = 32, 4 \times 8 = 32, 32 \div 4 = 8, 32 \div 8 = 4$$

The associative law:  
 $4 \times 12 \times 5 = 4 \times 5 \times 12$   
 $= 20 \times 12$   
 $= 240$

The commutative law:  
 $4 \times 12 = 12 \times 4$

I have 8 packets, each containing 12 crayons. How many crayons do I have in total?

Deriving related facts:

$$3 \times 2 = 6, 6 \div 3 = 2, 6 \div 2 = 3$$

$$\rightarrow 30 \times 2 = 60, 60 \div 3 = 20, 20 \div 6 = 3$$

### Written Calculations

- write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, progressing to formal written methods
- Estimate before calculating
- Ensure written methods build on/relate to mental methods

Towards the column method ...

x	20	4
6	120	24
	120	24
	144	

$120 + 24 = 144$

$24 \times 6$  becomes

x	24
6	144

Answer: 144

### Representations to support mental and written calculations.

$6 \times 3$

$3 \times 5$

3 groups of 40

$13p \times 3$   
 $= 10p \times 3 + 3p \times 3$   
 $= 30p + 9p$   
 $= 39p$

2 digit x 1 digit number:  
e.g.  $7 \times 38 = 266$

$19 \times 3 = 57$

$19 \times 3 = 57$

I can see eight groups of seven!

I can see seven, eight times!

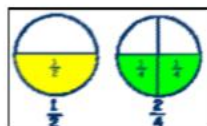
And seven groups of eight!

Use arrays for partitioning too

### Fractions

- recognise and show, using diagrams, equivalent fractions with small denominators

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2	4	6	8	10	12	14	16	18	20										
3	6	9	12	15	18	21	24	27	30										
4	8	12	16	20	24	28	32	36	40										
5	10	15	20	25	30	35	40	45	50										



### Links from other strands / bar modelling

- The comparison of measures includes simple scaling by integers (for example, a given quantity or measure is twice as long or five times as high)
- Pupils now use multiples of 2, 3, 4, 5, 8, 10, 50 and 100.
- Pupils understand and use simple scales (for example, 2, 5, 10 units per cm) in pictograms and bar charts with increasing accuracy
- solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which  $n$  objects are connected to  $m$  objects





## Y4 MULTIPLICATION

Informal methods to support mental Calculations	<ul style="list-style-type: none"> <li>recall multiplication and division facts for multiplication tables up to <math>12 \times 12</math></li> <li>use place value, known and derived facts to multiply and divide mentally, including:               <ul style="list-style-type: none"> <li>multiplying by 0 and 1;</li> <li>dividing by 1;</li> <li>multiplying together three numbers</li> </ul> </li> <li>recognise and use factor pairs and commutativity in mental calculations</li> <li>practise mental methods and extend this to three-digit numbers to derive facts, (for example <math>600 \div 3 = 200</math> can be derived from <math>2 \times 3 = 6</math>)</li> </ul> <div data-bbox="1137 369 1401 504" style="border: 1px solid orange; padding: 5px;"> <p>Using the <b>distributive law</b>:  <math>39 \times 7 = 30 \times 7 + 9 \times 7</math>          Using the <b>associative law</b>:  <math>(2 \times 3) \times 4 = 2 \times (3 \times 4)</math></p> </div> <div data-bbox="1185 521 1401 584" style="border: 1px solid orange; padding: 5px;"> <p>Using facts and rules:  <math>2 \times 6 \times 5 = 10 \times 6 = 60</math></p> </div>
Written Calculations	<ul style="list-style-type: none"> <li>multiply two-digit and three-digit numbers by a one-digit number using formal written layout</li> <li>Estimate before calculating</li> <li>Ensure written methods build on/relate to mental methods (e.g. grid method)</li> <li>Introduce alongside grid and expanded column methods</li> </ul> <div data-bbox="400 808 847 920"> </div> <div data-bbox="1042 607 1412 909" style="border: 1px solid orange; padding: 5px;"> <p>Key skills to support:</p> <ul style="list-style-type: none"> <li>know or quickly recall multiplication facts up to <math>12 \times 12</math></li> <li>understand the effect of multiplying numbers by 10, 100 or 1000</li> <li>multiply multiples of 10, for example, <math>20 \times 40</math>;</li> <li>approximate, e.g. recognise that <math>72 \times 38</math> is approximately <math>70 \times 40 = 2800</math> and use this information to check whether their answer appears sensible</li> </ul> </div> <div data-bbox="300 931 1412 987" style="background-color: orange; text-align: center; padding: 5px;"> <p><b>Revert to expanded methods if children find formal calculation method difficult</b></p> </div>
Representations to support mental and written calculations.	<p>Ensure children can confidently multiply &amp; divide by 10 and 100, that multiplying by 10 makes the number bigger and all digits move one place to the left, while dividing by 10 makes the number smaller and all the digits move one place to the right.</p> <div data-bbox="675 999 914 1211"> </div> <div data-bbox="866 999 1010 1178" style="border: 1px solid blue; border-radius: 50%; padding: 10px; color: blue;"> <p>This digit is worth 200</p> </div> <div data-bbox="1026 1021 1121 1178"> <math display="block">\begin{array}{r} 245 \\ \times 6 \\ \hline 1470 \end{array}</math> </div> <div data-bbox="1169 1021 1329 1178" style="border: 1px solid green; border-radius: 50%; padding: 10px; color: green;"> <p>This digit is worth 30</p> </div> <div data-bbox="1121 1133 1329 1256" style="border: 1px solid yellow; border-radius: 50%; padding: 10px; color: black;"> <p>I can use place value counters to model the grid method</p> </div> <div data-bbox="1345 1133 1412 1223" style="background-color: blue; color: white; padding: 5px; text-align: center;"> <p>Place value cards</p> </div> <div data-bbox="308 1223 770 1424" style="border: 1px solid orange; padding: 5px;"> <p>Use arrays made with place value counters to demonstrate the link between multiplication and division. This will support understanding of the grid method.</p> </div> <div data-bbox="786 1223 1074 1447" style="border: 1px solid orange; padding: 5px;"> <p>Children need to understand and apply the language of multiples and factors and use it in solving multiplication and division problems, for example, 'All factors of 36 are multiples of 2, true or false? Find me two factors of 48 that are also multiples of 3.'</p> </div> <div data-bbox="1090 1335 1313 1458"> </div>
Fractions	<ul style="list-style-type: none"> <li>recognise and show, using diagrams, families of common equivalent fractions</li> <li>understand the relation between non-unit fractions and multiplication and division of quantities, with particular emphasis on tenths and hundredths.</li> <li>make connections between fractions of a length, of a shape and as a representation of one whole or set of quantities.</li> <li>use factors and multiples to recognise equivalent fractions and simplify where appropriate</li> </ul> <div data-bbox="898 1581 1169 1671" style="border: 1px solid blue; padding: 5px;"> <math display="block">\frac{4}{10} = \frac{6}{15} = \frac{8}{20} = \frac{10}{25} = \frac{12}{30} = \frac{14}{35} = \frac{16}{40}</math> </div> <div data-bbox="1185 1581 1297 1671" style="border: 1px solid blue; padding: 5px;"> <math display="block">\frac{2}{5} = \frac{16}{40}</math> </div> <div data-bbox="1297 1525 1412 1704"> </div>
Links from other strands / bar modelling	<ul style="list-style-type: none"> <li>solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.</li> <li>Convert between different units of measure (e.g. km to m) - use multiplication to convert from larger to smaller units</li> <li>Understand the relation between non-unit fractions and multiplication/division of quantities. With particular emphasis on tenths and hundredths</li> <li>relate area to arrays and multiplication.</li> <li>Problem solving work can involve finding all possibilities and combinations drawing on knowledge of multiplication tables facts</li> <li>Pupils understand and use a greater range of scales in their representations (Statistics)</li> </ul>







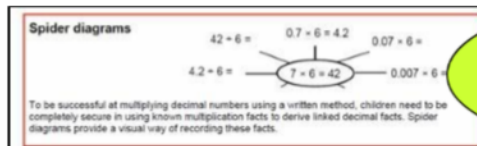
## Y5 MULTIPLICATION

Informal methods to support mental Calculations

- multiply and divide numbers mentally drawing upon known facts
- multiply and divide whole numbers and those involving decimals by 10, 100 & 1000
- Recognise and use square & cube numbers (& notation)

$$24 \times 15 = ?$$

Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions.



I did:  $24 \times 5 = 120$  (half of  $24 \times 10$ ), then multiplied 120 by 3 to get 360

I did:  $(24 \times 10) + (24 \times 5)$ .

Written Calculations

- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

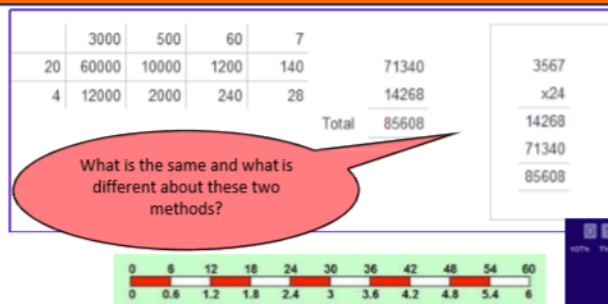
$24 \times 16$ becomes $\begin{array}{r} 24 \\ \times 16 \\ \hline 144 \\ 240 \\ \hline 384 \end{array}$	$124 \times 26$ becomes $\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \end{array}$	$124 \times 26$ becomes $\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \end{array}$	$2741 \times 6$ becomes $\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \end{array}$
Answer: 384	Answer: 3224	Answer: 3224	Answer: 16446

Compact methods for multiplication are efficient but often do not make the value of each digit explicit. When introducing multiplication of decimals, it is sensible to take children back to an expanded form such as the grid method where the value of each digit is clear, to ensure that children understand the process.

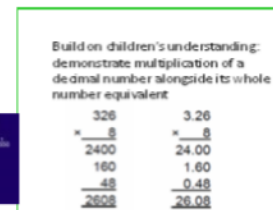
Does your answer seem reasonable?

Revert to expanded methods if children find formal calculation method difficult (see Y3/Y4)

Representations to support mental and written calculations.

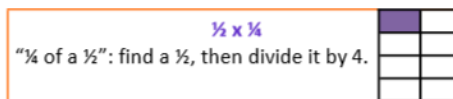
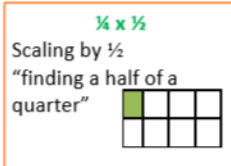


To start multiplying using the **least significant digit** for the grid method will support children with implementation of the written procedure



Fractions

- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
  - identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions  $> 1$ .



Encourage children to draw diagrams to represent situations or problems involving fractions. Model how to do this, for example:

$\frac{2}{5}$  of a number is 20. What is the number?

Links from other strands / bar modelling

- identify multiples & factors, including finding all factor pairs of a number, & common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes, and including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.
- convert between different units of metric measure; problems including money.

Other links: ratio,

Pupils use their knowledge of place value and multiplication and division to convert between standard units.

Pupils calculate the perimeter of rectangles and related composite shapes, including using the relations of perimeter or area to find unknown lengths. Missing measures questions such as these can be expressed algebraically, for example  $4 + 2b = 20$  for a rectangle of sides 2 cm and b cm and perimeter of 20cm.

Pupils calculate the area from scale drawings using given measurements.





## Y6 MULTIPLICATION

Informal methods to support mental Calculations	<ul style="list-style-type: none"><li>perform mental calculations, including with mixed operations and large numbers (increasingly large numbers &amp; more complex calculations)</li><li>use all the multiplication tables to calculate mathematical statements in order to maintain fluency.</li><li>use estimation to check answers to calculations &amp; determine, in the context of a problem, an appropriate degree of accuracy.</li><li>identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places.</li></ul> <div>Children should know the square numbers up to <math>12 \times 12</math> &amp; derive the corresponding squares of multiples of 10 e.g. <math>80 \times 80 = 6400</math></div> <div>Use mental strategies to solve problems e.g.<ul style="list-style-type: none"><li>x4 by doubling and doubling again</li><li>x5 by x10 and halving</li><li>x20 by x10 and doubling</li><li>x9 by multiplying by 10 and adjusting</li><li>x6 by multiplying by 3 and doubling</li></ul></div> <div>How many different <math>\times/\div</math> facts can you make using 72? 7.2? 0.72?</div> <div>What is the best approximation for <math>4.4 \times 18.6</math>?</div>										
Written Calculations	<ul style="list-style-type: none"><li>multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication (short &amp; long multiplication)</li><li>multiply one-digit numbers with up to two decimal places by whole numbers</li></ul> <div><math display="block">\begin{array}{r} \text{£} \quad 6.23 \\ \times \quad 27 \\ \hline 43.61 \\ 124.60 \\ \hline \text{£} \quad 168.21 \end{array}</math></div> <div>Revert to expanded methods if children find formal calculation method difficult (see Y4/Y5)</div>										
Representations to support mental and written calculations.	<div>Look at long-multiplication calculations containing errors, identify the errors and determine how they should be corrected</div> <div><table><tr><td>x</td><td>8</td><td>0.4</td><td>0.06</td><td></td></tr><tr><td>11</td><td>88</td><td>4.4</td><td>0.66</td><td>= 93.06</td></tr></table><div><math display="block">\begin{array}{r} 8.46 \\ \times 11 \\ \hline 93.06 \end{array}</math></div></div> <div><div><div>a</div><div><math>\times 3</math></div><div>b</div><div><math>+ 7</math></div><div>14.5</div></div><div>What's the same? What's different?</div></div>	x	8	0.4	0.06		11	88	4.4	0.66	= 93.06
x	8	0.4	0.06								
11	88	4.4	0.66	= 93.06							
Fractions	<ul style="list-style-type: none"><li>multiply simple pairs of proper fractions, writing the answer in its simplest form e.g. <math>\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}</math></li></ul> <div>Three key applications of understanding:<ul style="list-style-type: none"><li>Recognise that <math>\frac{1}{4}</math> of 12, <math>\frac{1}{4} \times 12</math> and 12 divided by 4 are equivalent</li><li>Use cancellation to simplify the product of a fraction and an integer e.g. <math>\frac{1}{4} \times 15 = 3</math>, <math>\frac{3}{4} \times 15 = 2 \times \frac{3}{4} \times 15 = 2 \times 3 = 6</math></li><li>Work out how many <math>\frac{1}{5}</math>s in 15, how many <math>\frac{2}{5}</math>s in 15, how many <math>\frac{2}{5}</math>s in 1 etc.</li></ul></div> <div><div><div><math>\frac{1}{4}</math></div><div><math>\frac{1}{4}</math></div></div><div>To calculate <math>\frac{1}{4} \times \frac{1}{4}</math>, find <math>\frac{1}{4}</math> of a rectangle/array, then divide that <math>\frac{1}{4}</math> into <math>\frac{1}{4}</math>s. So <math>\frac{1}{4}</math> of <math>\frac{1}{4}</math> is <math>\frac{1}{16}</math></div></div> <div>Pupils should use a variety of images to support their understanding of multiplication with fractions. This follows earlier work about fractions as operators (fractions of), as numbers, and as equal parts of objects, e.g. as parts of a rectangle.</div>										
Links from other strands / bar modelling	<ul style="list-style-type: none"><li>identify common factors, common multiples and prime numbers</li><li>use their knowledge of the order of operations to carry out calculations involving the four operations</li><li>solve problems involving addition, subtraction, multiplication and division</li><li>explore the order of operations using brackets; for example, <math>2 + 1 \times 3 = 5</math> and <math>(2 + 1) \times 3 = 9</math>.</li><li>Fractions, decimals and percentages including equivalences in different contexts.</li><li>solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts</li><li>solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison</li><li>solve problems involving similar shapes where the scale factor is known or can be found</li><li>solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.</li><li>Algebra including formulae, linear number sequences, combinations of variables</li><li>Measurement including solving problems with conversion of units, decimal notation, area &amp; volume</li><li>Statistics including pie charts, line charts and calculating the mean</li></ul>										





## EYFS DIVISION

The ELG states that children **solve problems**, including **doubling, halving and sharing**.

Children need to see and hear representations of division as both **grouping** and **sharing**.

Division can be introduced through halving.

Children begin with mostly pictorial representations linked to **real life contexts**:



**Grouping model**

Mum has 6 socks. She grouped them into pairs – how many pairs did she make?



**Sharing model**

I have 10 sweets. I want to share them with my friend. How many will we have each?

Children have a go at recording the calculation that has been carried out.

Although not explicit in the Development Matters document, the sharing model is a useful way of introducing young children to fractions and calculating with fractions.

Setting the problems in real life context and solving them with concrete apparatus will support children's understanding.

"I have got 5 bones to share between my two dogs. How many bones will they get each?"



Children have a go at recording the calculation that has been carried out.

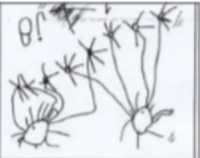

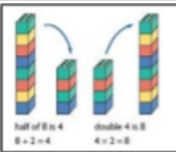
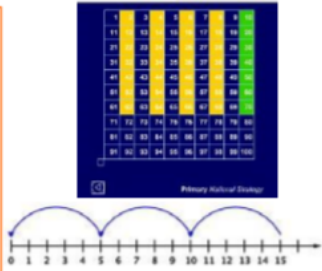

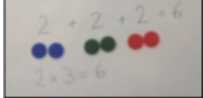


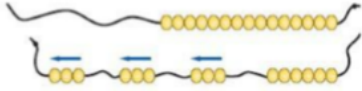
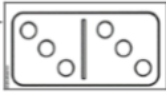
$$2\frac{1}{2} + 2\frac{1}{2} = 5$$







## Y1 DIVISION

Mental Calculations	<p>Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. (Pupils) make connections between arrays, number patterns, and counting in twos, fives and tens.</p>  <p>Count on or back in 2s, 5s and 10s and useful look for patterns.</p> 
Written Calculations	<p>Pictorial jottings to support the calculation of <math>8 \div 4</math></p>  <p>Children should experiment with the concepts of sharing and grouping in a number of contexts. Initially they use their own recording—moving towards fluent, symbolic notation in Year 2. Conceptual understanding and recording should be continuously supported by the use of <b>arrays</b> as a default model, as well as other representations, (see below.)</p>  <p>The relationship between multiplication and division must be continually considered.</p>
Representations to support mental and written calculations.	<p>Use a range of concrete and pictorial representations, including:</p> <ul style="list-style-type: none"> <li>Manipulatives to support children's own recording; and understanding of <i>sharing</i> and the link with multiplication.  <p>"How can we share 6 cakes between 3 people?"</p>  <p>Here, the cakes are placed in an array formation.</p>  <p>How many 2 tiles can we fit on the 6 tile?</p>  <p>Moving from concrete to pictorial, counters to represent the cakes to reinforce the relationship between multiplication and division.</p> </li> <li>Manipulatives, and real-life objects to support children's own recording; and understanding of <i>grouping</i> and the link with multiplication.   <p>Coat hangers and socks support calculation of <math>8 \div 2</math></p> <p>Bead strings</p>  <p>"Double 3 is 6. Half of 6 is 3."</p>  </li> <li>Dominoes and dice to reinforce concepts of doubling and halving.</li> </ul>
Fractions	<p>Recognise, find and name a half as one of two equal parts of an object, shape or quantity Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity. (See Representations above.)</p>
Links from other strands / bar modelling	<p>They practise counting as reciting numbers and counting as enumerating objects, and counting in twos, fives and tens from different multiples to develop their recognition of patterns in the number system (for example, odd and even numbers). (PLACE VALUE).</p> <p>Pupils are taught half and quarter as 'fractions of' by solving problems using shapes, objects and quantities. (FRACTIONS)</p>





## Y2 DIVISION

Calculations Mental	<p>The relationship between multiplication and division must be continually considered.</p> <ul style="list-style-type: none"> <li>Recall and use multiplication and division facts for the 2, 5, 10, 3s multiplication tables, including recognising odd and even numbers.</li> <li>Calculate mathematical statements for multiplication and division within</li> <li>the multiplication tables and write them using the multiplication (<math>\times</math>), division (<math>\div</math>) and equals (=) signs</li> </ul>
Calculations Written	<p>"5, one time", "5, two times" and so on.</p> <p>5 x 2 = 10   5 x 3 = 15   5 x 4 = 20</p> <ul style="list-style-type: none"> <li>Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</li> <li>Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts. (See below.)</li> </ul> <p><math>\frac{1}{2}</math> of 26 = 13  <math>26 \div 2 = 13</math></p> <p>Pupils decode a problem first, represent it using manipulatives and jottings; and finally record it symbolically.</p>
Representations to support mental and written calculations.	<p>Use a range of concrete and pictorial representations, including:</p> <ul style="list-style-type: none"> <li>Arrays           <div> <math>7 \times 2 = 14</math>  <math>14 \div 2 = 7</math> </div> </li> <li>Number lines to support grouping           <div> <math>10p + 10p + 10p + 10p + 10p = 50p</math>  <math>10p \times 5 = 50p</math>            5 hops of 10           </div> </li> </ul> <p>Representations to support multiplicative reasoning:</p> <p>Using Dienes: "If <math>40 \div 10 = 4</math> and <math>30 \div 10 = 3</math>, what do you think <math>70 \div 10</math> would be? Why?"</p>
Fractions	<p>Recognise, find, name and write fractions <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{3}{4}</math>, <math>\frac{2}{4}</math> of a length, shape, set of objects or quantity Write simple fractions for example, <math>\frac{1}{2}</math> of 6 = 3 and recognise the equivalence of <math>\frac{1}{2}</math> and <math>\frac{2}{4}</math>.</p>
Links from other strands / bar modelling	<ul style="list-style-type: none"> <li>Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward.</li> <li>Recognise the place value of each digit in a two-digit number (tens, ones) (PLACE VALUE).</li> <li>Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times, (MEASURES).</li> </ul>





## Y3 DIVISION

### Mental Calculations

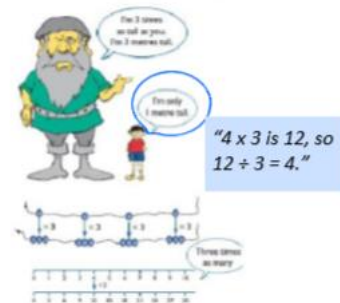
Pupils should be taught to recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.

*Pupils continue to practise their mental recall of multiplication tables... in order to improve fluency. Pupils develop efficient mental methods, for example, using commutativity and associativity (e.g.,  $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ ) and multiplication and division facts to derive related facts.*

$$36 \div 3 = 12$$

$$30 \div 3 = 10 \quad 6 \div 3 = 2$$

$$30 + 6 = 36$$

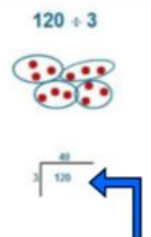


### Written Calculations

Pupils should be taught to:

- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.
- solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which  $n$  objects are connected to  $m$  objects, (see [Links from other strands](#), below.)

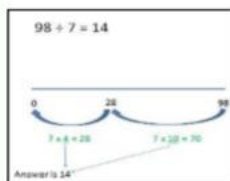
"I know  $6 \div 3 = 2$ , so  $60 \div 3 = 20$ ."  
"I know  $12 \div 3 = 4$ , so  $120 \div 3 = 40$ ."



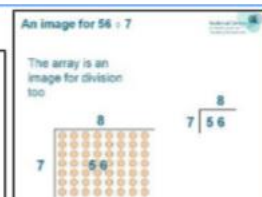
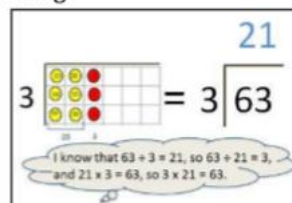
New written methods can be modelled alongside mental or informal methods to ensure understanding.

### Representations to support mental and written calculations.

Use a range of concrete and pictorial resources, including:

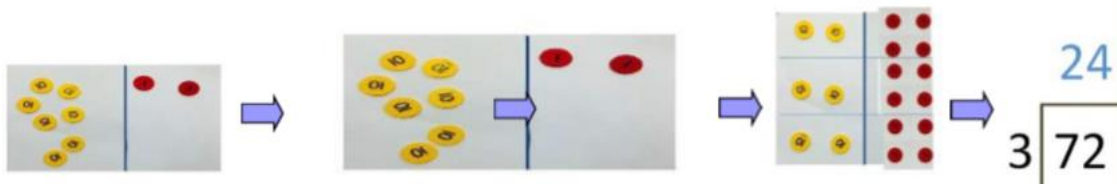


63 ÷ 3 equals three groups of 2 tens and a one.



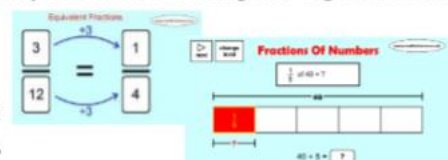
How could I calculate  $72 \div 3$ ?

Informal exploration with manipulatives supports the progression to formal written methods—which is continued in Year 4.



### Fractions

- Recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10.
- Recognise and show, using diagrams, equivalent fractions with small denominators.
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.



### Links from other strands / bar modelling


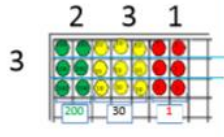
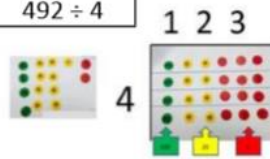
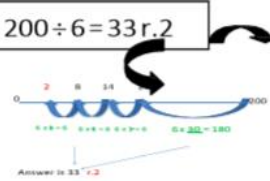


Solving fraction of amount word problems – including simple equivalents

Solve problems, including missing number problems division,





## Y4 DIVISION

Informal methods to support mental Calculations	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>recall multiplication and division facts for multiplication tables up to <math>12 \times 12</math></li> <li>use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers</li> <li>recognise and use factor pairs and commutativity in mental calculations</li> </ul> <p>Using known facts and blank arrays to calculate <math>176 \div 8</math>.</p>  <p><math>176 \div 8 = 22</math></p> <p><i>I know that <math>6 \div 3 = 2</math>, so <math>600 \div 3 = 200</math>.</i></p> <p><i>Pupils practise mental methods and extend this to three-digit numbers to derive facts.</i></p>
Written Calculations	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.</li> </ul> <p><i>Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers.</i></p> <p><b>Revert to expanded methods if children find formal calculation method difficult</b></p>
Representations to support mental and written calculations.	<p><math>693 \div 3</math></p>  <p>By working through larger number calculations with manipulatives, children gain experience of exchange (re-partitioning) within division algorithms.</p> <p><math>492 \div 4</math></p>  <p>Children can work in pairs: child A constructs the array (dividing manipulatives into 3 rows), child B checks it and records this in a formal, short division format.</p> <p><math>200 \div 6 = 33 \text{ r. } 2</math></p>  <p>By the end of Year 4, children need to have encountered remainders in a number of contexts. Pupils can be introduced to remainders using known facts: e.g. <math>13 \div 4</math>; and then progress to larger numbers. (See below).</p>  <p><b>Money can be used instead of place value counters.</b></p>
Fractions	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>recognise and show, using diagrams, families of common equivalent fractions</li> <li>recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.</li> <li>solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number</li> <li>find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths</li> </ul> 
Links from other strands / bar modelling	<ul style="list-style-type: none"> <li>Convert between different units of measure [for example, kilometre to metre; hour to minute]</li> <li>Estimate, compare and calculate different measures, including money in pounds and pence (MEASURES)</li> <li>Recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. (FRACTIONS)</li> </ul>







## Y5 DIVISION

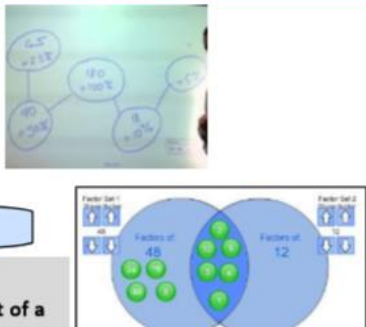
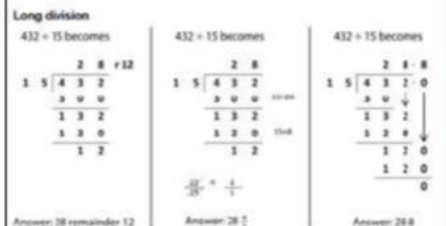

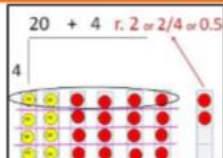
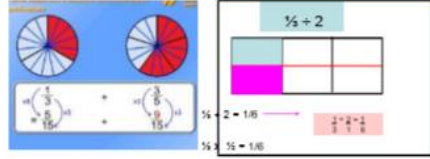
Informal methods to support mental Calculations	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>multiply and divide whole numbers and those involving decimals by 10, 100 and 1000</li> <li>multiply and divide numbers mentally drawing upon known facts</li> </ul> <p>identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid blue; padding: 5px; background-color: #e0f0ff;"> <p>If <math>42 \div 6 = 7</math></p> <p><math>\div 10</math>      <math>\div 10</math></p> <p>Then <math>4.2 \div 6 = 0.7</math></p> </div> <div style="border: 1px solid red; padding: 5px; background-color: #fff9e0;"> <p>Number lines</p> </div> <div style="border: 1px solid red; padding: 5px; background-color: #fff9e0;"> <p>Factorising</p> <p><math>480 \div 15</math></p> <p><math>= 480 \div 5 \div 3</math></p> </div> </div> <p><i>Pupils apply all the multiplication tables and related division facts frequently and use them confidently.</i></p> <div style="border: 1px solid blue; padding: 5px; background-color: #e0f0ff; margin-top: 10px;"> <p>"I know that the answer to <math>138 \div 6</math> will be close to 20, because <math>2 \times 6 = 12</math>, so <math>20 \times 6 = 120</math>."</p> </div>
Written Calculations	<p>Pupils practise and extend their use of the formal written methods of short multiplication and short division.</p> <ul style="list-style-type: none"> <li>Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.</li> </ul> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p><math>98 \div 7</math> becomes</p> <math display="block">\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \phantom{0} \\ 28 \\ \underline{28} \\ 0 \end{array}</math> <p>Answer: 14</p> </div> <div style="text-align: center;"> <p><math>432 \div 5</math> becomes</p> <math display="block">\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \phantom{0} \\ 32 \\ \underline{30} \\ 2 \end{array}</math> <p>Answer: 86 remainder 2</p> </div> <div style="text-align: center;"> <p><math>496 \div 11</math> becomes</p> <math display="block">\begin{array}{r} 45 \text{ r } 1 \\ 11 \overline{) 496} \\ \underline{44} \phantom{0} \\ 56 \\ \underline{55} \\ 1 \end{array}</math> <p>Answer: <math>45 \frac{1}{11}</math></p> </div> </div> <ul style="list-style-type: none"> <li>Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding. (See Representations below.)</li> </ul>
Revert to expanded methods if children find formal calculation method difficult	
Representations to support mental and written calculations.	<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>Can we divide this token into 6 equal groups?, then we must exchange it for ten tokens. Can we divide into 6 groups now?</p> </div> <div style="width: 35%; text-align: center;"> <p>Short division with exchange.</p> </div> <div style="width: 30%;"> <p>Practical experience with manipulatives is vital for children to talk through the language of division e.g. exchange, remainder; and to embed conceptual understanding.</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 10px;"> <div style="text-align: center;"> <p>Understanding remainders.</p> </div> <div style="text-align: center;"> <p><math>20 + 4 \text{ r } 2</math></p> </div> </div> <div style="margin-top: 10px;"> <p>2 out of a whole group of 4 = <math>\frac{2}{4} = \frac{1}{2} = 0.5</math></p> <p><math>98 \div 4 = \frac{98}{4} = 24 \text{ r } 2 = 24 \frac{1}{2} = 24.5</math></p> <div style="border: 1px solid blue; border-radius: 50%; padding: 10px; width: fit-content; margin: 10px auto;"> <p>What is the same? What's different about the ways that these remainders are expressed?</p> </div> </div>
Fractions	<ul style="list-style-type: none"> <li>Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements <math>&gt; 1</math> as a mixed number.</li> <li>Pupils connect equivalent fractions <math>&gt; 1</math> that simplify to integers with division and other fractions <math>&gt; 1</math> to division with remainders.</li> <li>Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division.</li> <li>Pupils should make connections between percentages, fractions and decimals</li> </ul>
Links from other strands / bar modelling	<ul style="list-style-type: none"> <li>Pupils use all four operations in problems involving time and money, including conversions. ....using decimal notation, including scaling.</li> <li>calculate and compare the area of rectangles (including squares). (MEASURES)</li> </ul> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <ul style="list-style-type: none"> <li>establish whether a number up to 100 is prime and recall prime numbers up to 19</li> <li>recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)</li> <li>solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes and including scaling by simple fractions and problems involving simple rates.</li> <li>solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. (NUMBER—MULTIPLICATION AND DIVISION)</li> </ul> </div>





# Great Wilbraham C of E Primary School

## Y6 DIVISION

Informal methods to support mental Calculations	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>perform mental calculations, including with mixed operations and large numbers.</li> <li>use their knowledge of the order of operations to carry out calculations involving the four operations.</li> <li>identify common factors, common multiples and prime numbers.</li> </ul> <p><i>I know that 366 will divide by 6 because it has 2 and 3 as factors</i></p> <ul style="list-style-type: none"> <li>Solve problems involving addition, subtraction, multiplication and division</li> <li>use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.</li> </ul> 
Written Calculations	<ul style="list-style-type: none"> <li>divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context</li> <li>divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.</li> <li>Pupils practise division for larger numbers, using the formal written methods of short and long division.</li> </ul> 
Representations to support mental and written calculations.	<p><b>Revert to expanded methods if children find formal calculation method difficult</b></p>  <p>£1362.72 ÷ 40 = ?</p> <p>£1362.72 ÷ 4 = £340.68 [½ and ½ again.] £340.68 ÷ 10 = £34.068 which rounds to £34.07.</p>  <p>To introduce the long division model, use a calculation which can be represented both with manipulatives and by a short division algorithm. Use questioning and discussion to compare written methods.</p> <p>2 4 r.2</p> <p>4 9 18 - 8 0 (4 x 20) 1 8 - 1 6 (4 x 4) 2</p> <p>What's the same? What's different?</p>
Fractions	<ul style="list-style-type: none"> <li>use common factors to simplify fractions,</li> <li>compare and order fractions, including fractions &gt; 1</li> <li>add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions</li> <li>divide proper fractions by whole numbers [for example, <math>\frac{1}{3} \div 2 = \frac{1}{6}</math> and by fractions – <math>\frac{2}{3} \div \frac{1}{3}</math></li> <li>associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375.]</li> <li>Pupils use their understanding of the relationship between unit fractions and division to work backwards Use written division methods in cases where the answer has up to 2 dp. Multiply mixed number fractions - <math>2\frac{3}{4} \times 4</math></li> </ul> 
Links from other strands	<ul style="list-style-type: none"> <li>Pupils are introduced to the division of decimal numbers by one-digit whole number, initially, in practical contexts involving measures and money. They recognise division as the inverse of multiplication.</li> <li>Pupils also develop their skills of rounding and estimating. This includes rounding answers to a specified degree of accuracy and checking the reasonableness of their answers. (FRACTIONS)</li> <li>solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate.</li> <li>use, read, write and convert between standard units....using decimal notation to up to 3d.p. (MEASURES)</li> <li>interpret and construct pie charts and line graphs and use these to solve problems</li> <li>calculate and interpret the mean as an average. (STATISTICS)</li> <li>solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts (RATIO AND PROPORTION)</li> </ul> <p><i>"8 is the best estimate for <math>72.34 \div 8.91</math>; because the numbers in the algorithm can be rounded to <math>72 \div 9</math>."</i></p>

