



St Giles Calculation Policy

March 2017

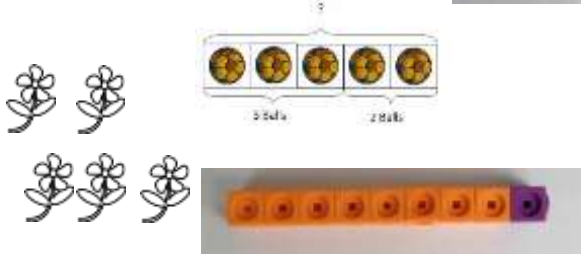
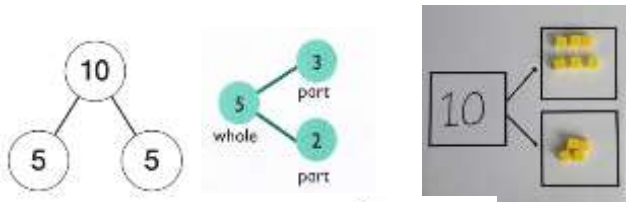


Add Plus Total + Addition + More Sum Altogether

Year R
Method to be used by core of class



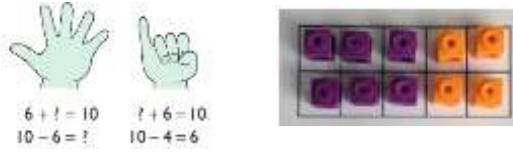
Use pictures, tens frames, cubes and other concrete resources to add two numbers together as a group or in a bar.



Year 1
Method to be used by core of class

As year R plus:
Teach all the number bonds up to and including 10 and the related 'Fact Family' for each fact.

$$\begin{array}{cc} 10 = 6 + 4 & 4 + 6 = 10 \\ 10 - 4 = 6 & 10 - 6 = 4 \end{array}$$



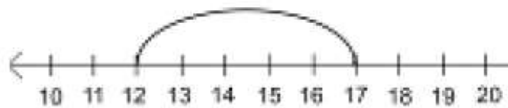
Use concrete objects to combine groups to add and solve missing number problems.

$3 + _ = 10$ Show this using the part/whole model.

Understand place value – can partition numbers and recombine numbers



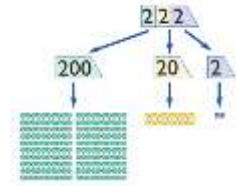
Usually start with the **biggest** number (if counting on)
 $12 + 5 = 17$



Start at the larger number on the number line and count on in ones or in one jump to find the answer.

Year 2
Method to be used by core of class

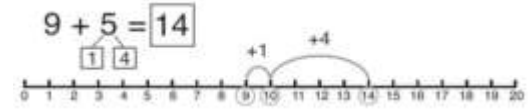
As year 1 plus:
Addition can be done in any order (commutative)
 $34 + 56$ or $56 + 34$
Understand place value – can partition numbers & recombine numbers



$$37 = 30 + 7 \quad 30 + 7 = 37$$

Use partitioning to add numbers, first with concrete apparatus, then as a possible mental method.

Have a range of mental methods for calculating first with numbers to 20, then with numbers to 100 e.g. breaking numbers apart to use them flexibly, this may be with a bridging strategy (e.g. $7+5$ could be thought of as $7+3+2$ or $5+5+2$), a compensating strategy (e.g. $7+9$ could be thought of as $7+10$ then -1) or by using a near double (e.g. $7+8 = 14+1$).



Learn to

add three numbers $4 + 7 + 6 = 17$

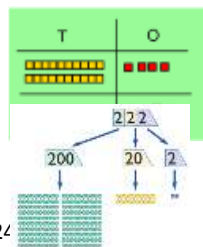
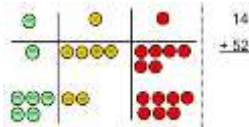
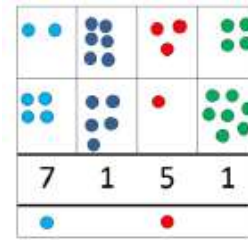
Put 4 and 6 together to make 10. Add on 7.

$$\begin{array}{l} (4 + 7 + 6) = 10 + 7 \\ \quad \quad \quad 10 \qquad \quad = 17 \end{array}$$



Use number bonds e.g. $4+6=10$ to work out $40+60=100$

Add Plus Total + Addition + More Sum Altogether

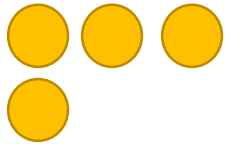
Year 3 Method to be used by core of class	Year 4 Method to be used by core of class	Year 5 Method to be used by core of class	Year 6 Method to be used by core of class
<p>As year 2 plus:</p>  <p>Understand place value – can partition numbers & recombine numbers to support column addition.</p> <p>24 Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.</p> <p>Expanded addition, TU then TU crossing tens barriers, then HTU (three digits)</p> $\begin{array}{r} 34 + 62 = \\ 34 \\ + 62 \\ \hline 96 \end{array}$  <p>494 + 368 =</p> $\begin{array}{r} 494 \\ + 368 \\ \hline 862 \end{array}$ <p>then Compact addition</p> $\begin{array}{r} 494 \\ + 368 \\ \hline 862 \\ \pm \pm \end{array}$	<p>As year 3 plus:</p> <p>Add ones, tens and hundreds to a three-digit number Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.</p>  <p style="text-align: right;">Compact addition (integers only) with numbers up to four digits</p> <p>e.g.</p> $\begin{array}{r} 7648 \\ + 1486 \\ \hline 9134 \\ \pm \pm \pm \end{array}$ <p>Expanded addition may be used for decimals in real contexts e.g. money and length.</p> <p>£11.35+ £12.43=</p> $\begin{array}{r} \text{£}10 + \text{£}1 + 30\text{p} + 5\text{p} + \\ \text{£}10 + \text{£}2 + 40\text{p} + 3\text{p} \\ \text{£}20 + \text{£}3 + 70\text{p} + 8\text{p} = \text{£}23.78 \end{array}$	<p>As year 4 plus:</p> <p>Compact addition with numbers larger than four digits. Compact addition with decimals to two places.</p> <p>e.g.</p> $\begin{array}{r} 32.75 \\ + 48.64 \\ \hline 81.39 \\ \pm \pm \end{array}$ $\begin{array}{r} 23.361 \\ 9.080 \\ 59.770 \\ - 1.300 \\ \hline 93.511 \\ \pm \pm \end{array}$	<p>As year 5 plus:</p> <p>Compact addition involving large numbers. Compact addition with decimals to three places.</p> <p>e.g.</p> $\begin{array}{r} 32.756 \\ + 48.646 \\ \hline 81.402 \\ \pm \pm \pm \end{array}$ <p>24.5+ 36.238</p> $\begin{array}{r} 24.500 \\ + 36.238 \\ \hline 60.738 \\ \pm \end{array}$

Subtract take away less than - **Subtraction** - minus difference between

Year R

Method to be used by core of class

Use physical objects, counters, cubes etc to show how objects can be taken away.



$$6 - 2 = 4$$



Imagine one less spot

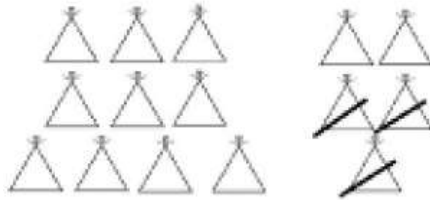


Use counters and bead strings, move them away from the group as you take them away counting backwards as you go.

Year 1

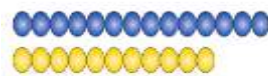
Method to be used by core of class

As year R plus:

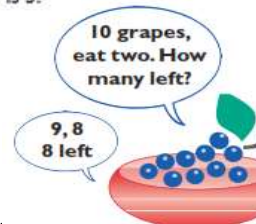
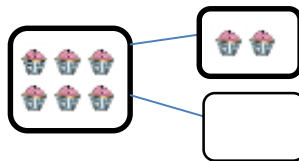


$$15 - 3 = \boxed{12}$$

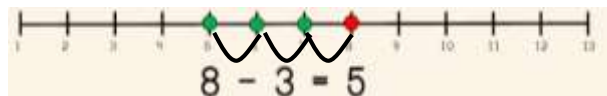
Understand that subtraction can be seen as taking away and finding the difference. Use the part-whole model to take away.



The difference between 11 and 14 is 3.



First with concrete apparatus, then number 1 mentally. Count back on a number line or number track when secure with concrete apparatus.



Year 2

Method to be used by core of class

As year 1 plus:

Subtract using concrete objects such as Numicon, make the whole and take away the correct amount. Then progress to pictorial representations and mental methods.

Start at the bigger number and count back the smaller number showing the jumps on the number line.



$$6 + ? = 10$$

$$10 - 6 = ?$$

$$7 + 6 = 10$$

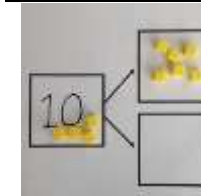
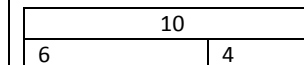
$$10 - 4 = 6$$

$$57 - 23 = \quad 37 \quad \quad \quad 47 \quad \quad \quad 57$$



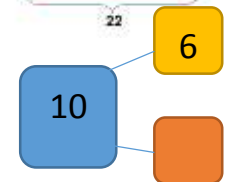
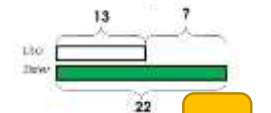
This can progress all the way to counting back using two 2 digit numbers.

No. bonds to 100 (at least with multiples of 10). Understand the number line as a continuum. Understand that subtraction is the inverse of addition (Numicon is a particularly useful image) and bar model.


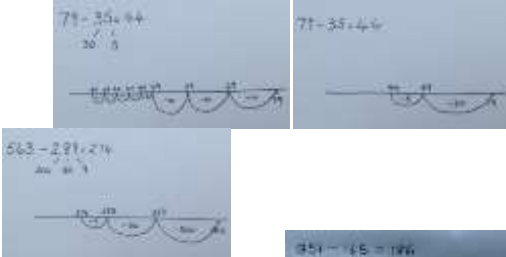

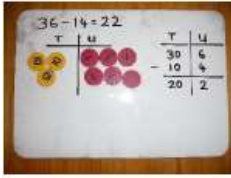
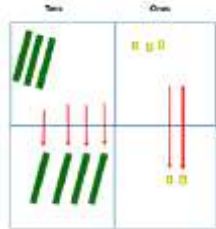

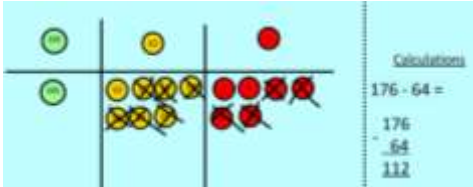
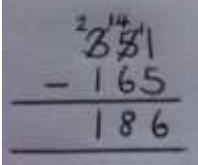
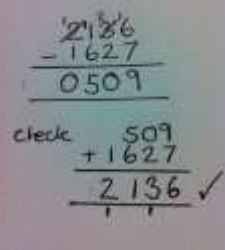
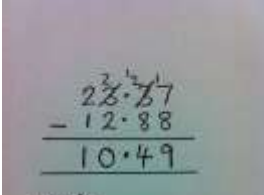
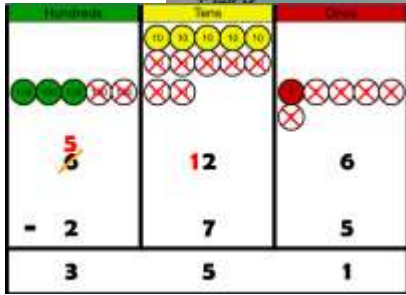


Comparison Bar Models

Uma is 13 years old. Her sister is 22 years old. Find the difference in age between them.



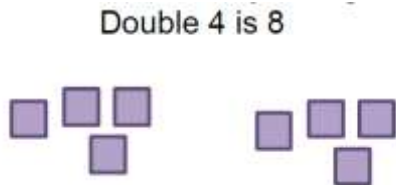
Subtract take away less than - **Subtraction** - minus difference between

<p>Year 3 Method to be used by core of class</p>	<p>Year 4 Method to be used by core of class</p>	<p>Year 5 Method to be used by core of class</p>	<p>Year 6 Method to be used by core of class</p>
<p>As year 2 plus: Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.</p>  <p>Counting back along the number line – partitioning</p>  <p>Number line method (2 and 3 digit numbers) 351-165=186</p>  <p>Begin expanded subtraction using concrete objects and pictorial representations.</p>   <p>Expanded method 63 - 25</p> $\begin{array}{r} 63 \\ - 25 \\ \hline 38 \end{array}$	<p>As year 3 plus: Number line method (2, 3, 4 digit numbers, extending to decimals in a real context) e.g.</p>  <p>Expanded subtraction e.g. 354 - 165</p> $\begin{array}{r} 354 \\ - 165 \\ \hline 189 \end{array}$  <p>Use base 10 or place value counters alongside the written calculation to help to show working.</p> <p>Compact subtraction</p> 	<p>As year 4 plus: Compact subtraction, involving numbers larger than 4 digits and with decimals to 2 places.</p>   <p>Draw the</p>  <p>counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make. When confident children can find their own way to record the exchange/regrouping.</p>	<p>As year 5 plus: Compact subtraction involving large numbers. Compact subtraction with decimals up to three places.</p>

Multiply times lots of **x Multiplication x** groups of multiple of product

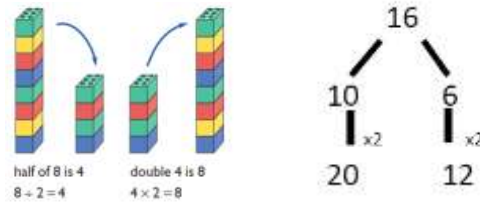
Year R
Method to be used by core of class

Introduce language and concept of making equal groups.
Begin to double numbers to 5. Use concrete apparatus to show how to double a number.

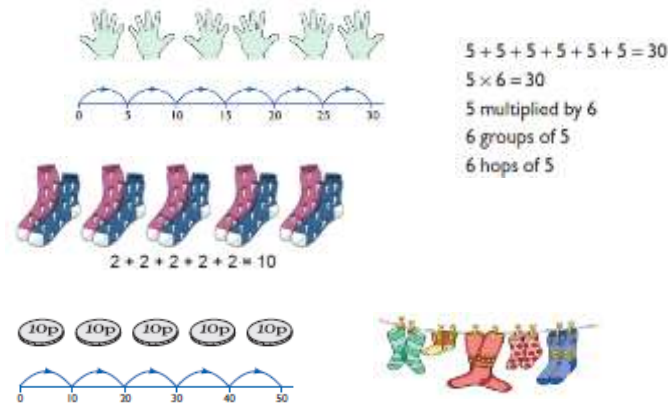


Year 1
Method to be used by core of class

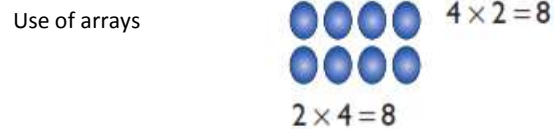
As year R plus:
Recall doubles to 10. Use this knowledge to support halving and doubling larger numbers.



Understand multiplication as repeated addition.



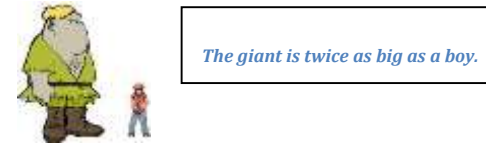
Group sets of objects reliably in 2s, 5s and 10s.
Recognise number sequences e.g. 2s, 5s and 10s.



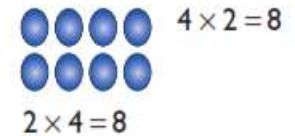
Year 2
Method to be used by core of class

As Year 1 plus:
By the end of the year pupils should recall all multiplication facts for the 2, 5 and 10 times tables.

Understand multiplication as scaling.



Understand that multiplication is commutative (arrays eg. Numicon particularly useful).



Understand that multiplication and division are the inverse of each other.

- 4x10=40
- 10x4=40
- 40÷4=10
- 40÷10=4

Multiply times lots of x Multiplication x groups of multiple of product

Year 3
Method to be used by core of class

As year 2 plus:
Focus on understanding, representing and remembering times tables facts for 2,5,10,3,4 and 8 times tables, including division facts



Note - before moving to any TU x U, the children will need be able to multiply a multiple of 10 by a single digit (T0xU)
Numicon or Cuisenaire in the grid
e.g. 20×4 , 40×5

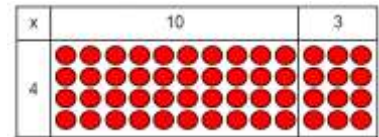
See multiplication appendix 4 arrays- showing commutative multiplication. Appendix 5 grid method.

Year 4
Method to be used by core of class

As year 3 plus:
ALL times tables facts to 12×12 should be known by end of year 4 including multiplying by 0 and 1. Children should learn to multiply three numbers together.

$4 \times 6 \times 3 =$
 $4 \times 6 = 24 \times 3 = 72$

Grid method TU x U or HTU x U
Show the link with arrays to first introduce the grid method.
e.g. 4×13



e.g. 7×39

x	30	9	
7	210	63	
			273

(but know when to calculate mentally e.g. $\times 2$, $\times 10$, $\times 5$)

e.g. 245×6

x	200	40	5	
6	1200	240	30	

1200
 240
 30

 7680

Year 5
Method to be used by core of class

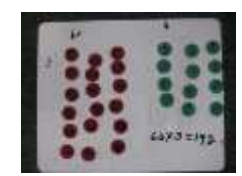
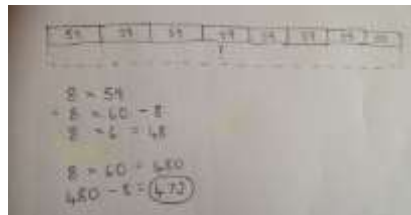
As year 4 plus:
Multiply with numbers up to 4 digits.
Grid Method for TU x TU, HTU x TU, THU x TU or U.

e.g. 35×46

x	30	5	
40	1200	200	
6	180	30	

1200
 180
 $+ 200$

Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written method.

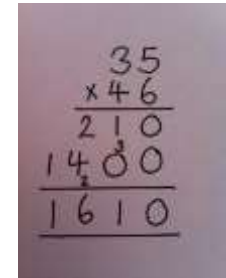


Long Multiplication (expanded)



Year 6
Method to be used by core of class

As year 5 plus:
Long Multiplication
Up to 4 digit x 2 digit



Moving to... Decimal numbers to 2 places multiplied by whole numbers

Note -some children may continue to use the grid method

If it helps, children can write out what they are solving next to their answer.

32
 $\times 24$

 64 (4×2)
 640 (4×30)
 704 (20×2)
 7680 (20×30)


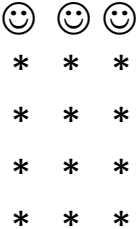

Share equally group equally divide ÷ **Division** ÷ remainder factor quotient

Year R
Method to be used by core of class


Introduce language and concept of sharing fairly and making equal groups.

Year 1
Method to be used by core of class

Understand division as sharing equally into groups.
Share into groups using concrete apparatus then move to pictorial representations.

Know multiplication facts (including the related 'fact family' e.g $3 \times 5 = 15$, $5 \times 3 = 15$, $15 \div 3 = 5$, $15 \div 5 = 3$)



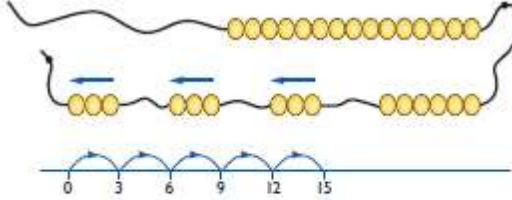
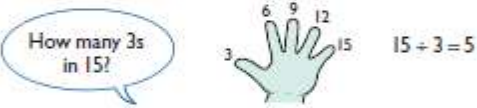
$3 \times 5 = 15$ $15 \div 5 = 3$

$5 \times 3 = 15$ $15 \div 3 = 5$


Finding half and quarter using the same methods.

Year 2
Method to be used by core of class


As Year 1 plus:
By the end of the year pupils should recall all division facts for the 2, 5 and 10 times tables.

How many 3s in 15? $15 \div 3 = 5$



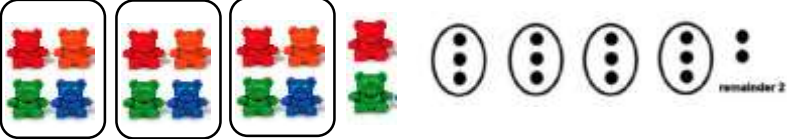
5 hops in 15. How big is each hop?
 $15 \div 5 = 3$




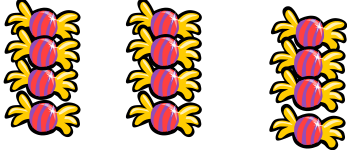
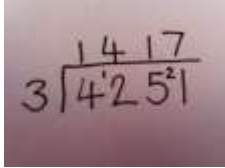
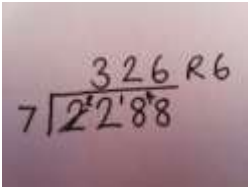

Link division to multiplication by creating an array and thinking about the number sentences that can be created.

Eg $15 \div 3 = 5$ $5 \times 3 = 15$
 $15 \div 5 = 3$ $3 \times 5 = 15$

Finding remainders: Divide objects between groups and see how much is left over $14 \div 3 =$



Share equally group equally divide ÷ **Division** ÷ remainder factor quotient

Year 3 Agreed method to be used by core of class	Year 4 Agreed method to be used by core of class	Year 5 Agreed method to be used by core of class	Year 6 Agreed method to be used by core of class
<p>As year 2 plus: Focus on understanding, representing and remembering times tables facts for 2,5,10,3,4 and 8 times tables, including division facts.</p> <p>e.g. </p> <p>4x8=32. 8x4=32, 32÷4=8, 32÷8=4</p>	<p>As year 3 plus: Focus on understanding, representing and remembering times tables facts for ALL times tables up to 12 x12 including division facts.</p> <p>It is especially important that children understand that division can be grouping or sharing.</p> <p>e.g. 12÷3=4 12 sweets between 3 people gives 4 sweets each.</p>  <p>(3 groups of 4) 'How many 3s in 12?' gives 4 groups of 3</p>	<p>As year 4 plus: Short division, up to 4 digit numbers divided by 1 digit numbers e.g. 4251÷3</p>  <p>Including dealing with remainders in context.</p>  <p>7 7 14 14 21 21 28 28</p> <p>Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.</p>	<p>As year 5 plus: Short division, up to 4 digit numbers divided by 1 or 2 digit numbers e.g. 423 ÷ 18</p>  <p>1x 18 2x 36 5x 90</p> <p>or Long division</p> 