STANLEY GROVE SCHOOL WRITTEN CALCULATION POLICY

These are the **written methods** which will be taught to the children. The methods are in developmental order and teachers will use earlier or later methods as appropriate to the children whom they are teaching and their level of understanding.

Children should still experience a wide range of practical activities to underpin their learning and then the skills should be extended into a wide range of real life and problem solving situations.

Decimals need to be delivered early in Key Stage Two.

Updated: December 2018 by the teaching staff, subject leader and senior leadership team.

ADDITION

Step One: Covered in Reception and secure by end Y1

Oral counting
Numberline and concrete objects to support. Pictorial representation important, as are practical activities.

Move to informal recording and bar modelling (mathematical graphics).
Symbols introduced when appropriate to record simple number sentences.

Step Two: To be secure by end Y1

Adding along a numberline and adding using bar modelling:

Number lines will be demarcated in increments of one to begin with.

4+3=

Step Three: To be secure by end Y2

Partitioning:

27+29= 56

20+20=40
7+ 9=16

40+10+6=56

Can also do as 'car parks' for each total. One car park for tens and one car park for the ones, then add the totals (see Big Maths).

27+29= 56

40 16

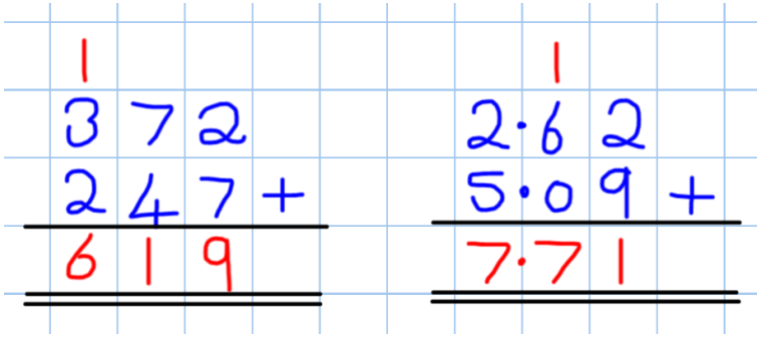
Can be extended into three digit numbers.

Linear Partitioning:

372+217=

300+ 70+2
200+ 10+7 +
500+ 80+9 = 589

Step Four: No carrying forward to be secure by end KS1. With carrying forward and decimals to be secure by end Y3.



When carrying forward, children are taught to place the digit above the others already in the column, so that it does not get lost or forgotten (indicated here in red).
Children are taught that decimal points sit on the line, not in a box of their own.

SUBTRACTION

Step One: Covered in Reception and secure by end Y1

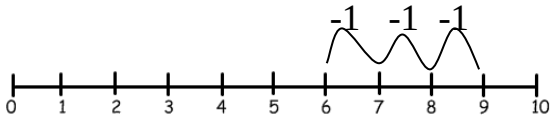
Oral counting
Numberline and concrete objects to support. Pictorial representation important, as are practical activities.

Move to informal recording and bar modelling (mathematical graphics). Symbols introduced when appropriate to record simple number sentences.

Step Two: To be secure by end Y1

Subtraction using bar modelling and along a numberline:
9-3=6

Children will be taught to count both backwards to find the missing amount and forward to find the difference.
9 – 3 = 6



Step Three: To be secure by end Y2

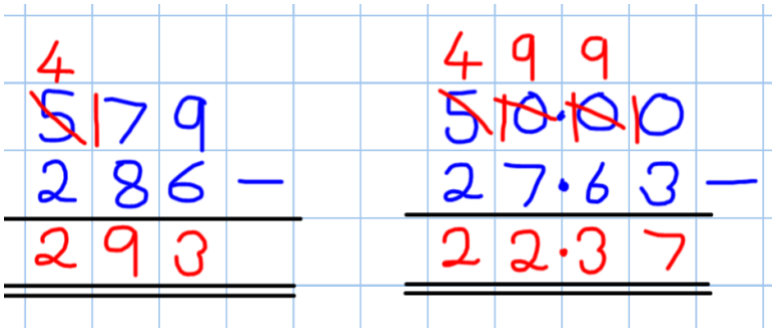
Review and secure finding the difference and the associated language (including using bar modelling).

Partitioning Subtraction:
Taught where no taking from the next column along is needed.

26-14=

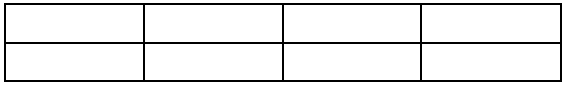
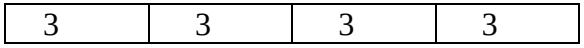
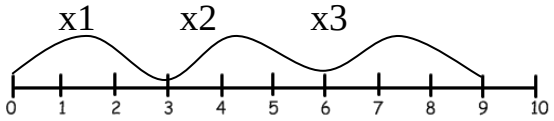
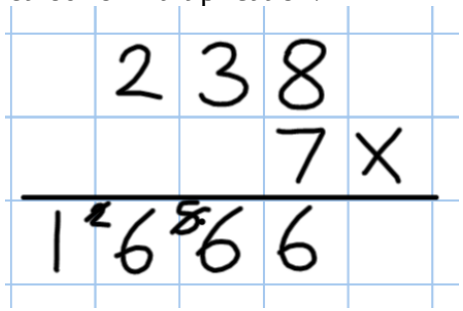
20 6
10 4 -
10 + 2 = 12

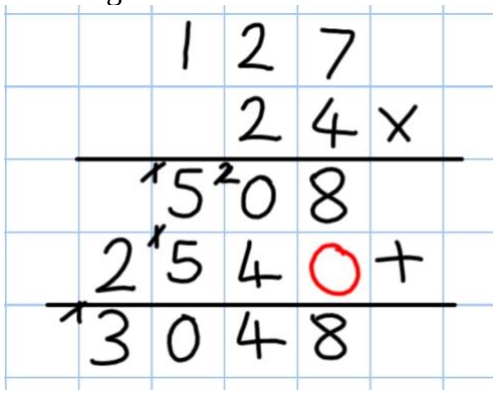
Step Four: Formal method no 'taking' to be secure by end KS1. Formal method with 'taking' to be secure by end Y3. With 'taking' and decimals to be secure by end Y4.



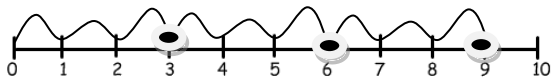
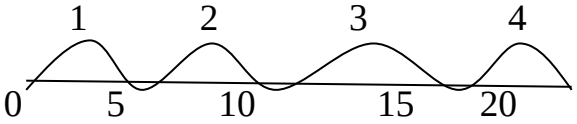
The term 'take' is used when it is necessary to make a number larger. When a number is taken from, the new number should be written above and the one taken written in the column. Numbers with decimal points should be introduced as soon as children are ready.

MULTIPLICATION

Step One: Covered in Reception and secure by end Y1	Step Two: To be secure by end Y1	Step Three: To be secure by end Y2	Step Four: 2 digit x1 digit secure by end Y3. 3 or 4 digit x 1 digit to be secure by end Y4.
Discussion in terms of 'groups of' and 'lots of' Introduction of basic arrays linked to counting 'groups of' as visual stimulus – children are not expected to record in this way. Plenty of concrete then pictorial models used.	Using arrays: 4x2  Bar modelling: 4x3  And introduce equal leaps on a number line: 3 x 3 = 9  	Partitioning to multiply using Smile Multiplication from Big Maths. Partition the larger number into tens and ones or hundreds, tens and ones first. 16 x 2 =32 is the same as: 10x2 (20) 6x2 (12) Then add totals: 20=12=32	Children are taught the short form method for multiplication:  Carry digits forward under the line to enable the method in step five. Carried forward digits must be small and placed in top left of box in next column, then crossed out once used.

Step Five: To be secure by end Y5.	Step Six: To be secure by end Y5.
Children are taught to use '0' as place holders for larger calculations, including HTUxTU  The children will be expected to accurately calculate in this fashion for five and six digit numbers.	Using method to calculate with numbers which include decimal places: The children will be expected to accurately calculate in this fashion for five and six digit numbers, including numbers with two decimal places. We teach the children to do the sum in exactly the same way as a whole number sum with no decimals (see Step 5), then to put the same number of decimal places in the answer as there are in the sum. For example: 127x24=3048 as in Step 5 So: 12.7x24=304.8 (one decimal place in the question, so one decimal place in the answer) And: 12.7x2.4=30.48 (two decimal places in the question, so two decimal places in the answer)

DIVISION

Step One: Covered in Reception and secure by end Y1	Step Two: Covered in Y1. To be secure by end Y2 where 'remainders' would also be included.	Step Three: To be secure by end Y3.
Focus on 'sharing' as a practical idea as well as a social concept. Practical activities sharing objects into groups of so many: E.g.: there are eight sweets and four children, let's share the sweets into groups of four and see how many sweets we'll get each.	Division on a number line (link with 'Where's Mully?' from Big Maths): Focus on 'dividing into groups of' as language to secure understanding. Count up the number line in groups of the divisor (3 in this case) to see how many groups there would be. 9 ÷ 3 = 3 1 group 2 groups 3 groups  Then larger range and extending above known multiples (e.g. 42 ÷ 2) 20 ÷ 5 = 4 groups  For Y2: If it was 22÷5 use same method but show remainder 2 at the end. (22÷5=4 r.2)	All children will be taught the standard short method for division as soon as they fully understand place value and the principles of division as well as having a secure grounding in the vocabulary of the method. 0 2 1 r 3 6) 1 1 2 9

Step Four: To be secure by end Y4.	Step Five: To be secure by end Y5
Children to be taught to add decimals to the end for dividing money etc. $$\begin{array}{r} 148.4 \\ 5\overline{)\,7\,{}^{2}4\,{}^{4}2\,.{}^{2}0} \end{array}$$	Children are taught to divide by a 2 digit number as follows: 435÷25= $$\begin{array}{r} 017.4 \\ 25\overline{)\,4\,{}^{4}3\,{}^{18}5\,.{}^{10}0} \end{array}$$ Put the first 6-7 multiples of the number in a column down the side next to the sum: 25 50 75 100 125 150 175

FRACTIONS

Adding Fractions

Example 1: Secure by end Y2

Example 2: pictorially using bar model secure by end Y3 and using maths only secure by end Y4. Converting between mixed numbers and improper fractions needs to be secure by end Y4.

Example 2 with mixed number same denominator addition to be secure by end Year 5 (1 3/5 + 2 4/5 for example)

Adding fractions with different denominators secure by end Y5. (5/6 + 1/3 for example)

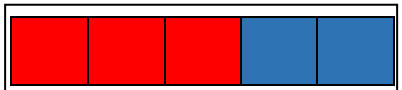
Simplifying answer to an addition secure by end Y5

Example 3: Secure end Y6

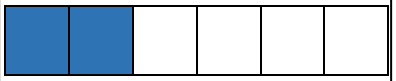
$\frac{2}{5} + \frac{2}{5} = \frac{4}{5}$

$\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$

$2\frac{5}{6} + 3\frac{1}{3} = \frac{17}{6} + \frac{20}{6} = \frac{37}{6} = 6\frac{1}{6}$



3/5



4/5

= 7/5 which we see is 1 whole and 2/5

Subtracting Fractions

Example 1: Secure by end Y2

Example 2: pictorially using bar model secure by end Y3 and using maths only secure by end Y4. Converting between mixed numbers and improper fractions needs to be secure by end Y4.

Example 2 with mixed number same denominator subtraction where no conversion of mixed number to improper fraction needed also to be secure by end Year 3 (4 3/5 - 3 2/5 for example)

Example 2 with mixed number same denominator subtraction where conversion of mixed number to improper fraction needed to be secure by end Year 5 (4 3/5 - 3 4/5 for example)

Subtracting fractions with different denominators secure by end Y5. (5/6 - 1/3 for example)

Simplifying answer to a subtraction secure by end Y5

Example 3: Secure end Y6

$\frac{4}{5} - \frac{2}{5} = \frac{2}{5}$

$3\frac{2}{5} - \frac{4}{5} = \frac{17}{5} - \frac{4}{5} = \frac{13}{5} = 2\frac{3}{5}$

$2\frac{2}{3} - \frac{5}{6} = \frac{16}{6} - \frac{5}{6} = \frac{11}{6} = 1\frac{5}{6}$

Addition and Subtraction Fractions outcomes (taken from Stanley Grove Scheme of Work):
Year One:

- Recognise 1/3, ¼, ¾, 2/4 of a shape.
- write simple fractions for example ½ of 6 = 3 and recognise the equivalence of 2/4 and ½

Year Two:

- Recognise 1/3, ¼, ¾, 2/4 of a shape, length, shape, set of objects or quantity.
- write simple fractions for example ½ of 6 = 3 and recognise the equivalence of 2/4 and ½
- add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 = 6/7}

Year Three:

- add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 = 6/7}
- recognise and show, using diagrams, families of common equivalent fractions
- add and subtract fractions with the same denominator (inc whole numbers) 2 1/3+ 2 1/3

Year Four:

- 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
- add and subtract fractions with the same denominator (inc whole numbers: 2 1/3+ 2 1/3)

Year Five:

- add and subtract fractions with the same denominator and multiples of the same number

Year Six:

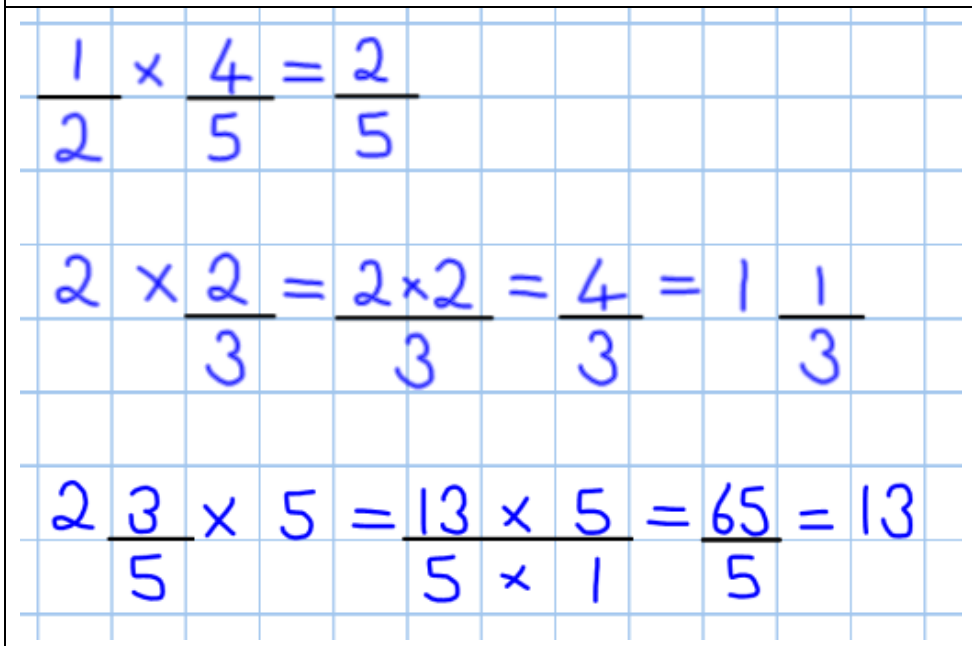
- add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions

Multiplying Fractions

Example 1: Secure by end Y5

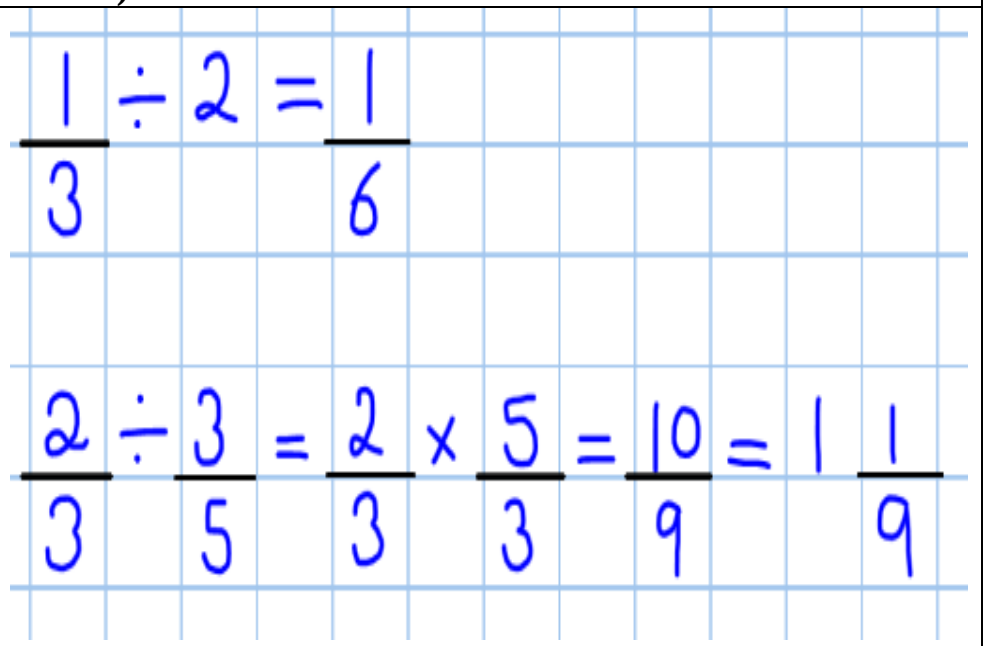
Example 2: secure by end Y5

Example 3: Secure end Y6



Dividing Fractions

Secure end Y6:
Use KFC method:
KEEP the first thing (1/3).
CHANGE the sign (from divide to multiply).
FLIP the final thing (2 – or 2/1 – becomes ½)
Now do the sum as you would multiplying a fraction. (1/3 x ½ =1/6)



Multiplication and Division Fractions outcomes:
Year Five:

- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams

Year Six:

- multiply simple pairs of proper fractions, writing the answer in its simplest form [for example,1/4 x ½ = 1/8)
- divide proper fractions by whole numbers [for example,1/3 divided by 2 = 1/6]