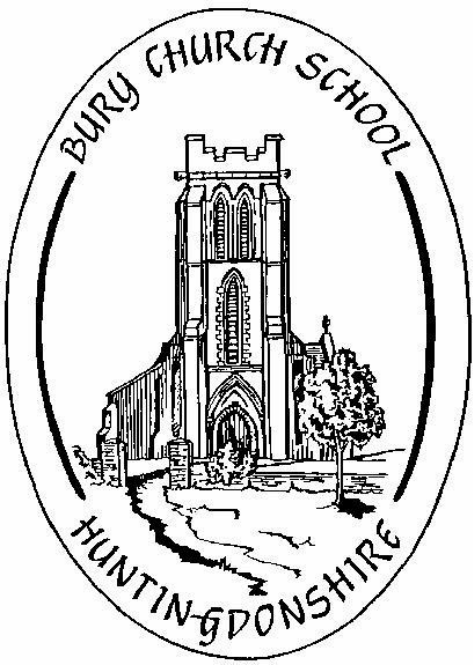


Bury C of E Primary School

Mathematics Calculations Progression Document

YEAR 2

At Bury CE Primary, we believe that children should be introduced to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas, they develop ways of recording to support their thinking and calculation methods; use particular methods that apply to special cases and learn to interpret and use the signs and symbols involved.

Choosing the appropriate strategy, recording in mathematics and in calculation in particular is an important tool both for furthering the understanding of ideas and for communicating those ideas to others. Children use age appropriate calculations in order to become **fluent** in that strategy, they will then use calculation strategies to support their thinking and **reasoning,** making connections in their mathematical understanding and for them to become efficient at **problem solving**.

Written methods are complementary to mental methods and should not be seen as separate from them. The aim is that children use mental methods when appropriate, but for calculations that they cannot do mentally they use an efficient written method accurately and with confidence. It is important children acquire secure mental methods of calculation and one efficient written method of calculation for addition, subtraction, multiplication and division which they know they can rely on when mental methods are not appropriate.

This document identifies progression in calculation strategies.

By the end of Year 6, children should be able to choose the most appropriate approach to solve a problem: making a choice between using jottings (an extended written method), an efficient written method or a mental method.

This policy contains the key procedures that will be taught within our school alongside practical resources. It has been written to ensure consistency and progression throughout the school and reflects a whole school agreement.

For a further understanding of mathematics terminology, please see the NCETM 'mathematics glossary' on our school website for an explanation of terms used in each Key Stage.

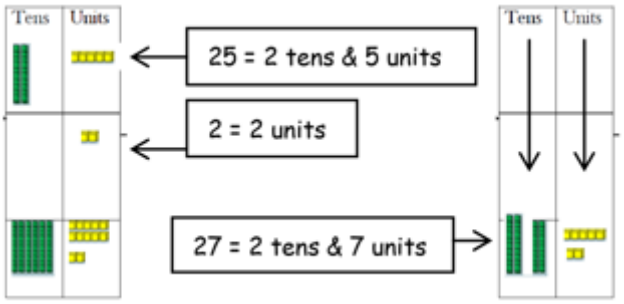
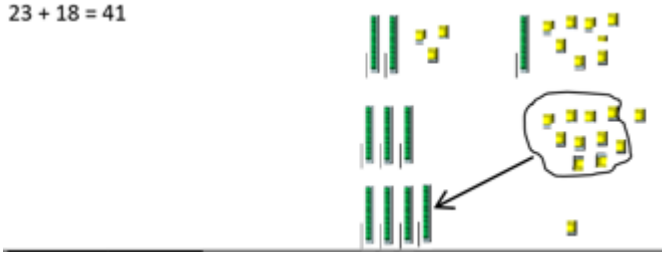
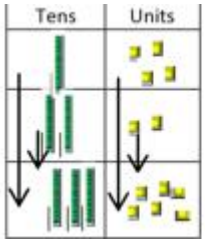
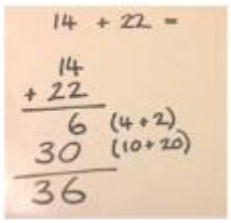
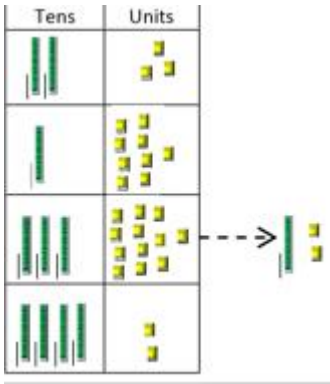
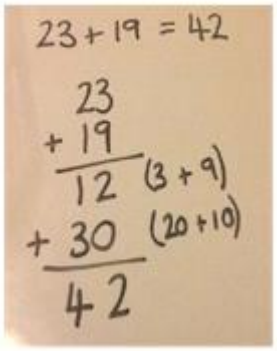
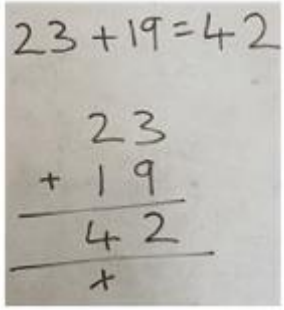
Recommended websites/ blogs:

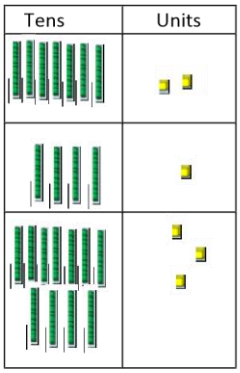
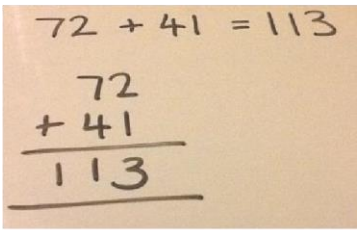
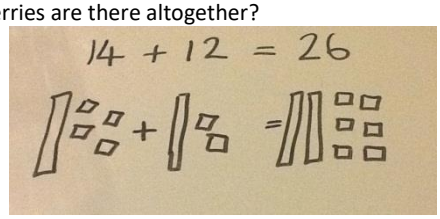
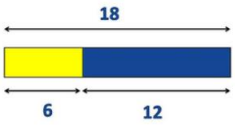
https://www.bbc.co.uk/bitesize/primary
https://garethmetcalfe.wordpress.com/
http://www.mathematicshed.com/
https://ttrockstars.com/
https://nrich.maths.org/
https://www.ncetm.org.uk/

*Note: the terminology of 'ones' and 'units' in the following diagrams is the same concept, meaning a single value.

Year 2 – Addition

VOCABULARY: add, addition, more, plus, make, sum, total, augend, addend, altogether, score, double, near double; one more, two more etc…, one hundred more, 'how many more make….?' How many more is…..than….?' tens boundary.
Across all year groups, the questions 'what is the same/ different?' is asked. This supports children with noticing patterns, making connections and making comparisons.

Method	**Example/ representation:**
Children will use concrete objects and pictorial representations to add: • A 2-digit number and units • Three 1-digit numbers and a 2-digit number • Multiples of 10.	25 + 2 = 27 
Children will partition numbers into tens and ones when adding two 2-digit numbers that cross the tens boundary.	23 + 18 = 41 
With support, children begin to move on from using a number line and set out tens and ones in a formal calculation, using manipulatives such as dienes apparatus if needed, in the form of an **expanded column method.**	14 + 22 = 36  
Using **expanded column method** (as above), but crossing the tens boundary. With support, setting out tens and ones as a formal **column method**.	23 + 19 = 42   23 =19 = 42 

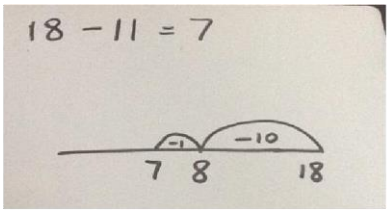
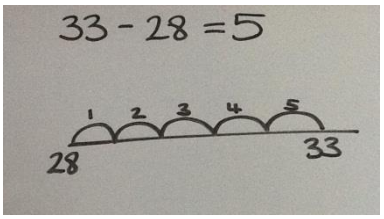
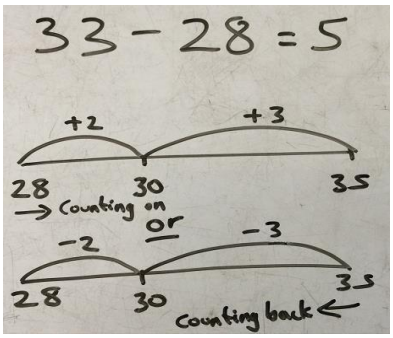
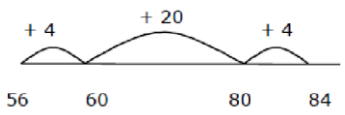
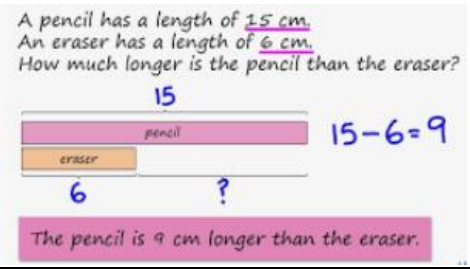
Children begin to set out tens and ones + tens and ones (that cross the hundreds boundary) in columns and record as column addition	  
Children will solve simple addition problems using concrete objects and pictorial representations (such as the bar model), including those involving number, quantities and measures.	George has 14 strawberries and Jess has 12 strawberries. How many strawberries are there altogether?  There are 6 children in Year One that have a school meal on a Monday and 12 children in Year Two that have a school meal. How many children have school meals on a Monday in Year One and Two?  **6 + 12 = 18**

EXPECTATIONS:

- Know that addition is the inverse of subtraction.
- Add numbers mentally, including:
  - A 2-digit number and units
    A multiple of 10 to a 2-digit number
    Two 2-digit numbers
    Three 1-digit numbers
- Use knowledge of inverse to check calculations and solve missing number problems
- The position of a digit determines its value e.g. 41 is more than 14 due to the place value of the digit 4 being different.
- Addition can be performed in any order e.g. 12 + 7 + 5 is the same as 5 + 12 + 7 (understanding part/ whole relationship)
- Use knowledge of number bonds to 10 to calculate numbers bonds to 100
- Count on in tens from any given number (e.g 19 – 29 – 39 – 49 etc)
- Number facts can be approximated using known knowledge e.g. 29 + 8 is one less that 30 + 8
- Numbers can be partitioned to calculate e.g. 32 + 15 is the same as 32 + 10 + 5.

YEAR 2 - Subtraction

VOCABULARY: subtract, minus, leave, minuend, subtrahend, how many are left/left over?, how many less is… than…?, how much fewer is…?, difference between, half, halve, equals, sign, is the same as, partition, inverse, count on , count back, one less, ten less… one hundred less. Across all year groups, the questions 'what is the same/ different?' is asked. This supports children with noticing patterns, making connections and making comparisons.

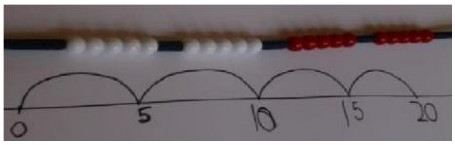
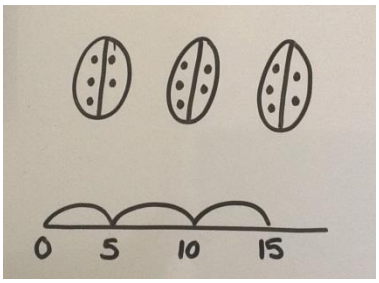
Method:	**Example/Representation:**
Children are encouraged to use a blank number line to solve TO – TO and **count back** in tens and then ones by: - Positioning the first number in the number sentence at the end of the number line. - Partitioning the second number into tens and ones - Counting back in tens (or multiples of 10) - Counting back in ones	 
Children will use their knowledge of **finding the difference** to use a blank number line to count on from the smallest number to the largest number (in tens and ones) to solve subtraction number sentences (TO – TO) .	
Children will be encouraged to draw their own number line and begin to **decide on the most efficient strategy that works for them**: whether to start with the smaller number and count on or start with the larger number and count back	
Recognise and use **inverse** relationship between addition and subtraction and use this to check calculations and solve missing number problems	84 - 56 = ☐ 56 + ☐ = 84 
Children will solve one and two-step subtraction problems involving number, quantities and measures using concrete objects and pictorial representations such as the bar method model.	

EXPECTATIONS:

- To know that subtraction is the inverse of addition and use knowledge of inverse to check calculations. They are linked and can describe part/ whole relationships e.g. 9 + 7 = 16 and 16 – 7 = 9.
- Subtraction can be done by either **counting back** or **finding the difference**.
- Subtract numbers mentally, including:
  - subtracting ones from a 2-digit number and subtracting a multiple of 10 from a 2-digit number
- Recall and use subtraction facts to 20 fluently
- Use knowledge of number bonds to 100 (multiples of 10) to reason (40 + 60 = 100 so 100 – 60 = 40 and 100 – 40 = 60)

YEAR 2 – Multiplication

VOCABULARY: odd, even, twos, fives, tens, threes, lots of, groups of, once, twice, three times, five times, ten times, multiple of, times, multiply, multiplicand, multiplier, multiply by, repeated addition, array, row, column, double.

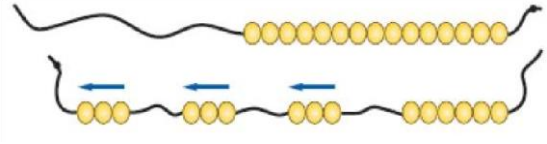
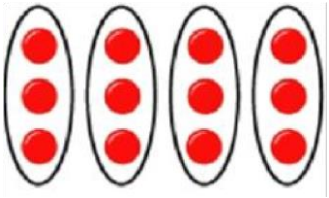
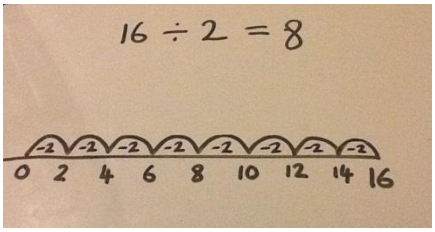
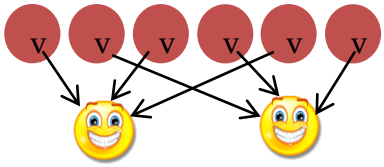
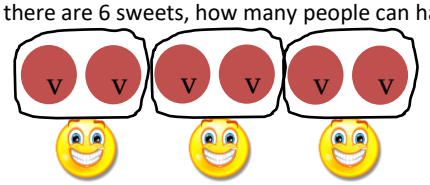
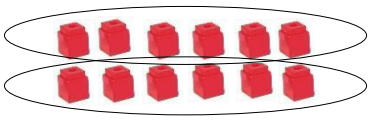
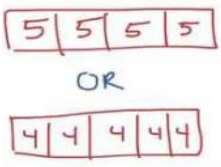
Method:	**Example/Representation:**
Children will be able to recognise and write the multiplication symbol (x) in mathematical statements	
Children will understand the operation of multiplication as **repeated addition on a blank number line** and will use practical resources to support this	4 x 5 = 15 
Children will be able to **represent a multiplication calculation using an array and write the multiplication symbol within a number sentence.** Children will also understand that multiplication can be carried out in any order (commutative)	 3 x 5 = 15 5 x 3 = 15
Children will solve one-step multiplication problems (including missing number problems) using concrete objects and pictorial representations	I have 3 ladybirds with 5 spots each. How many spots do they have altogether? 

EXPECTATIONS:

- Count forwards and backwards in multiples of 2, 5 and 10.
- **Know the 2, 5 and 10 times tables (in and out of order)**
- Recognise odd and even numbers
- Multiplication is adding the same number
- Multiplication and division are inverse operations (shown as arrays).
- There are connections between the times tables e.g. the 10x table is double the 5x table.

YEAR 2 - Division

VOCABULARY: groups of, equal groups of, halve, share, share equally, divide, divided by, divided into, repeated subtraction, inverse.

Method:	**Example/Representation:**
Children will understand the operation of **division as grouping using repeated subtraction** using concrete apparatus and on a number line	 15 ÷ 3 = 5
Children will be able to represent a division calculation using an array and write the division within a number sentence	How many groups of 3 are in 12? 12 ÷ 3 = 4 
Children will use a blank number line to carry out repeated subtraction to solve a division number sentence	
Children will be taught to **understand the difference between sharing and grouping.**	If 6 sweets **are shared** between 2 people, how many do they get each?  Sharing If there are 6 sweets, how many people can have 2 sweets each? 
Children will solve one-step division problems (including missing number problems) using concrete objects and pictorial representations, such as the bar model method.	12 ÷ ☐ = 6  20 ÷ 4 = 5 

EXPECTATIONS:

- To know that division is the inverse of multiplication
- To know that division can be carried out by **sharing** e.g. 15 ÷ 3 as 15 shared into 3 sets; or **grouping** 15 ÷ 3 as how many 3s in 15?
- Recall division facts for the 2, 5 and 10 times tables
- Recall halves for even numbers up to and including 20