Approach to Calculations at Church Gresley Infant and Nursery School.

This document exemplifies a recommended progression through the four operations, beginning in the Foundation Stage. All calculation symbols are colour coded and linked to statements for use across school from Nursery to Year 2, with the emphasis on clear, concise language and consistent explanations of key concepts. For example, the addition calculation symbol is blue and it will be taught using the same vocabulary:

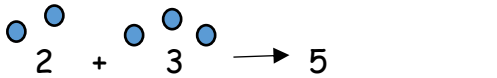
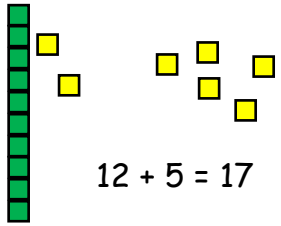
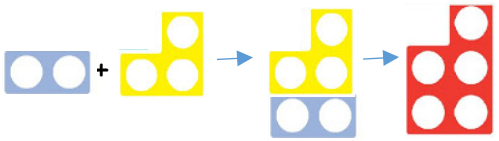
+ ~ start with a number, add some more, the answer will get bigger!

MENTAL CALCULATIONS:

ADDITION & SUBTRACTION	MULTIPLICATION & DIVISION
Counting on or back in repeated steps of 1, 2 and 5 from 0, and in 10s from any number. One more/one less than a number. Ten more/ten less than a number. Mental recall of number bonds/addition and subtraction facts to 10/20. Find a small difference by counting up. Use near doubles 6 + 7 = double 6 + 1 = 13 Addition/Subtraction using partitioning and recombining: 34 + 45 = (30 + 40) + (4 + 5) = 79 47 – 23 = (40-20) + (7-3) = 24 Use the relationship between addition and subtraction: 11+17=28 17 +11=28 28-17=11 28-11=17	Doubling and halving Knowing that doubling is multiplying by 2 Knowing that halving is dividing by 2 Using multiplication/division facts: 2 times table 5 times table 10 times table

Children's mental fluency and recall of basic number facts will also be improved through the use of the Number Sense Maths scheme in Nursery/Reception and White Rose Fluency Bee in Year 1 and Year 2.

ADDITION

	Standard/ Comprehension	Application
EYFS	Children engage in a wide variety of songs and rhymes, games and activities. Using quantities and objects, they add two single-digit numbers and count on to find the answer. They begin to relate addition to combining two groups of objects, first by counting all and then by counting on from the largest number. They will find one more than a given number. They develop ways of recording calculations using pictures, etc. Children are also given opportunities to record written number sentences as appropriate.	In practical activities and through discussion they will begin to use the vocabulary involved in addition.  'You have five apples and I have three apples. How many apples altogether?' Construct number sentences verbally or by using number cards to match objects. Solve simple problems using fingers and manipulatives such as cubes, counters and 5 or 10 frames, beadstrings, numicon. Number lines and number tracks can be used to support counting on and one more than. Print/draw round Numicon shapes.
<u>Year 1</u>	Understand that addition is combining two sets of objects. Relate addition to counting on. Say one more than a given number (up to 100) Read, write and interpret mathematical statements involving addition (+) and the equals (=) sign Supported by Dienes/Numicon/tens frames, begin to understand place value in numbers beyond 20. Understand the effect of adding zero.	Using objects and pictures (cubes, counters, Numicon, Dienes/Base 10, tens frames) can add together two single digit numbers/two digit numbers within 20 and count on to find the answer.   

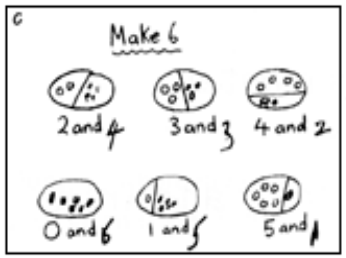
Add one- digit and two-digit numbers within 20, including zero

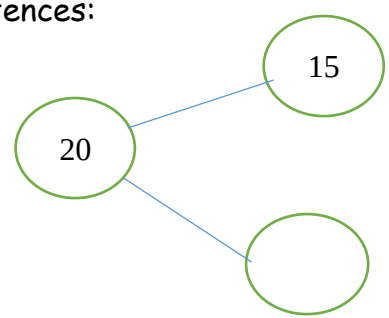
Solve missing number problems eg 10 + □ = 16
Vocab: more than, most, add, count on, altogether. put together, plus, add, total.

Missing numbers need to be placed in all possible places.
3 + 4 = □
□ = 3 + 4
3 + □ = 7
7 = □ + 4

Bead strings can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.

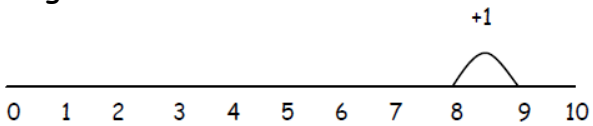
Develop ways of recording calculations using pictures moving on to recording addition number sentences:





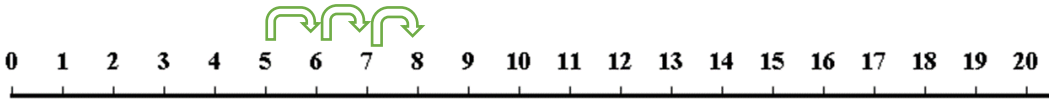
20 = 15 + □

Using a number line to add two numbers together.

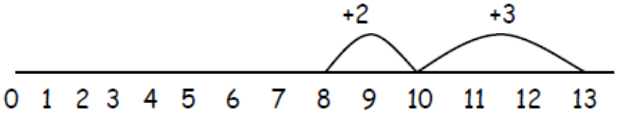


8 + 1 = 9

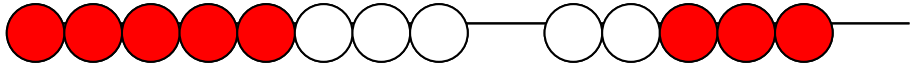
Adding 5 + 3 = 8
Start on the biggest number and count **on** in jumps.



Splitting numbers to bridge through 10.



8 + 5 = 13



Using a 100 square to add in steps of 1 or 10.

12	13	14	15

13 + 2 = 15

45	46	47
55	56	57
65	66	67

46 + 20 = 66

Year 2

Add numbers using concrete objects, pictorial representations, and **mentally**, including:

- A two digit number and ones
- A two digit number and tens
- Two two-digit numbers
- Three one-digit numbers

Vocab: sum, inverse, partition, multiple of 10.

Supported by Dienes/10s and 1s counters/arrow cards, understand place value in **two-digit numbers** and how zero is a place holder.

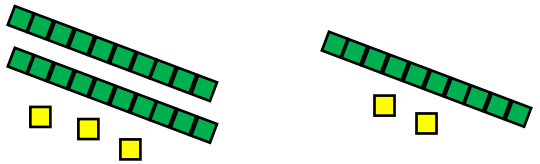
Children will use 'empty number lines' themselves starting with the larger number and counting on.

Understand that addition is commutative e.g. 48 + 36 = 36 + 48

Understand that subtraction is the inverse of addition. e.g. 48 + 36 = 84, 36 + 48 = 84, 84 – 36 = 48, 84 – 48 = 36

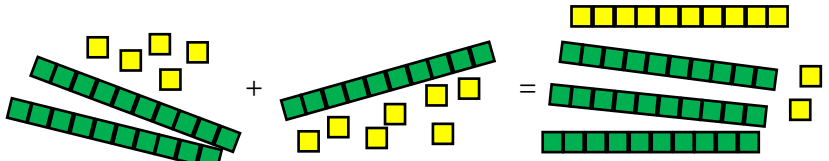
Missing number problems e.g 14 + 5 = 10 + □
32 + □ = 47
35 = 1 + □ + 4

Using objects and pictures Dienes/Base 10 (tens and ones apparatus):



23 +12 = 35

Using Dienes (exchanging ten ones for a ten):



25 + 17 = 42

Drawing Dienes to add, including crossing 10:

32 + 13 = 45

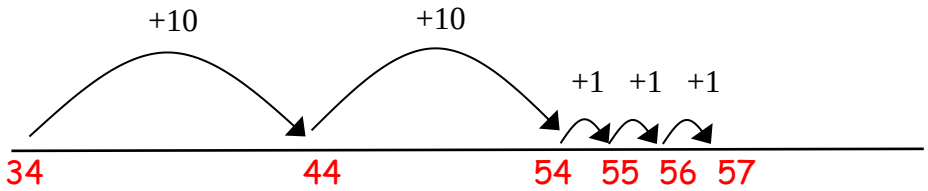


38 + 24 =

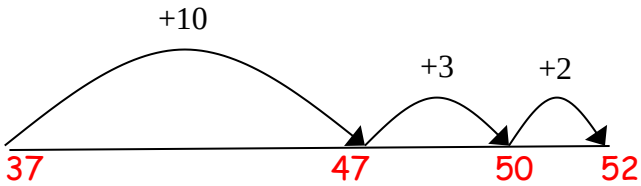


(cross out 10 ones and replace with a 10 stick)

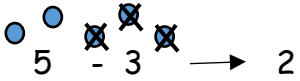
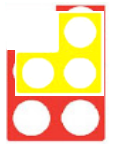
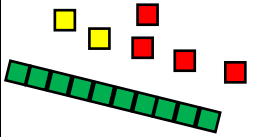
Using an empty number line to add two-digit numbers:
34 + 23 = 57

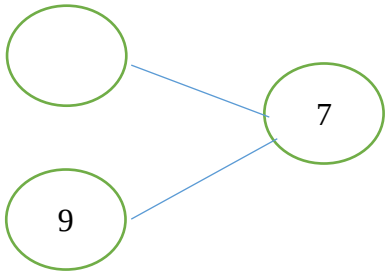
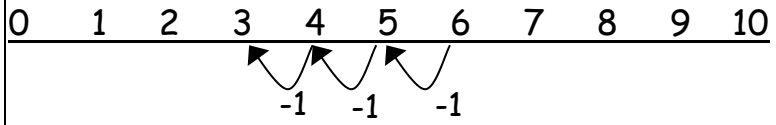
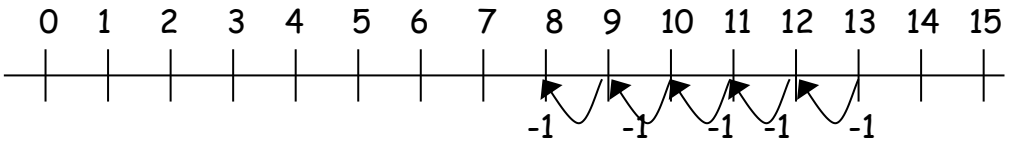
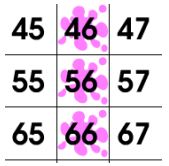
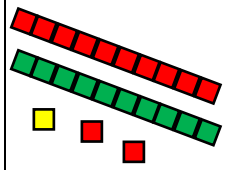
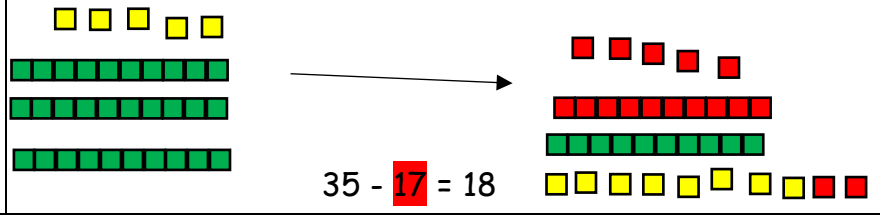


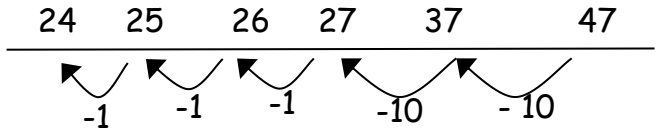
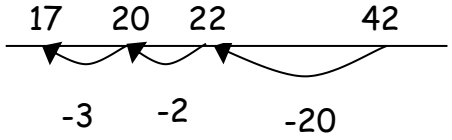
Bridging through ten:
37 + 15 = 52



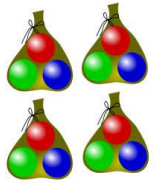
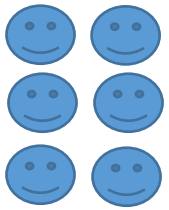
SUBTRACTION

	Standard/ Comprehension	Application
EYFS	Children will engage in a variety of counting songs and rhymes and practical activities. Using quantities and objects, they subtract two single-digit numbers and count back to find the answer. They will begin to relate subtraction to 'taking away' using objects to count 'how many are left' after some have been removed. They will find one less than a given number. They develop ways of recording calculations using pictures, etc. Children are also given opportunities to record written number sentences as appropriate.	In practical activities and through discussion they will begin to use the vocabulary associated with subtraction. 6 – 2 = 4  'Take two apples away. How many are left?' Construct number sentences verbally. Solve simple problems using fingers and manipulatives such as cubes, counters and 5 or 10 frames, beadstrings, numicon. Number lines and number tracks can be used to support counting back and one less than.
Year 1	Given a number, identify one less Read, write and interpret mathematical statements involving subtraction(–) and the equals (=) sign Subtract one- digit and two-digit numbers within 20, including zero Solve missing number problems eg 20 – ☐ = 15 Understand subtraction as taking away **and** counting on to find the difference. Understand the effect of subtracting zero.	Using objects, beads and pictures, can subtract two single digit numbers and count back to find the answer.  5 - 3 → 2 Putting one numicon over the other to compare and counting on to find the difference.  Using Base 10/Dienes to subtract within 20:  16 – 4 = 12

	Children use numbered lines to support their own calculations - using a numbered line to count back in ones. The number line can also be used to show that 6 - 3 means the 'difference between 6 and 3' or 'the difference between 3 and 6' and how many jumps they are apart. Missing number problems e.g. 7 = □ - 9; 20 - □ = 9; 15 – 9 = □; □ - □ = 11; 16 – 0 = □  *Vocab: take away, minus, distance between, difference.*	Using a number line to take away/subtract 6 – 3 = 3  13 - 5 = 8  Using a 100 square to take away in steps of 1 or 10. 12 13 14 15 15 - 2 = 13 66 - 20 = 46 
Year 2	Subtract numbers using concrete objects, pictorial representations, and **mentally**, including: • A two digit number and ones • A two digit number and tens • Two two-digit numbers Understand that subtraction is **not** commutative e.g. 48 - 36 = 36 - 48 Understand that subtraction is the inverse of addition. e.g. 48 + 36 = 84, 36 + 48 = 84, 84 – 36 = 48, 84 – 48 = 36.	Using objects and pictures Dienes/Base 10 (tens and ones apparatus):  23 - 12 = 11 Using Dienes (exchanging a ten for ten ones): 

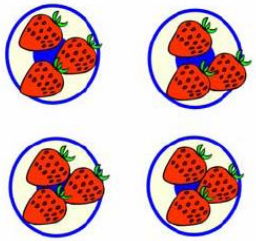
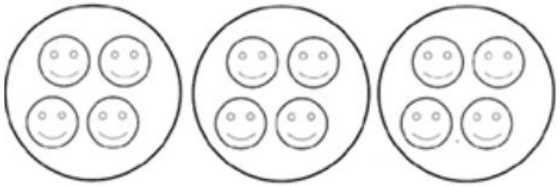
	Children to begin to make choices about whether counting on or back is more efficient for different calculations. Missing number problems e.g. 52 – 8 = □; □ – 20 = 25; 22 = □ – 21; 6 + □ + 3 = 11 Use the inverse operation to solve missing number problems *Vocab: decrease, inverse, partition, multiple of 10, exchange.*	Drawing Dienes to subtract, including crossing 10: 34 - 13 = 21  42 - 24 =  (cross out a 10 stick and draw 10 ones) Using an empty number line to subtract two-digit numbers: 47 – 23 = 24  Bridging through ten: 42 – 25 = 17 

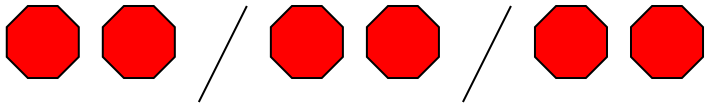
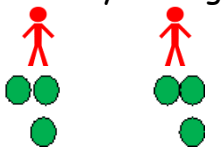
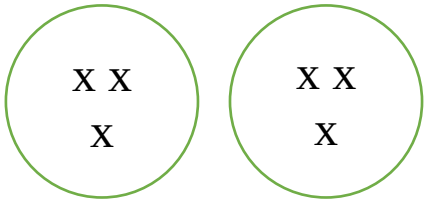
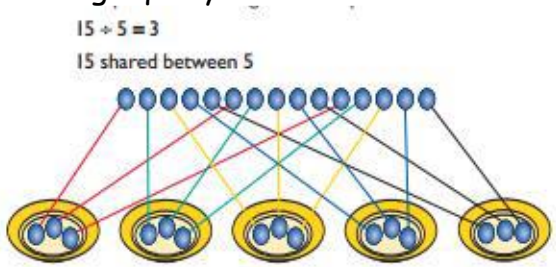
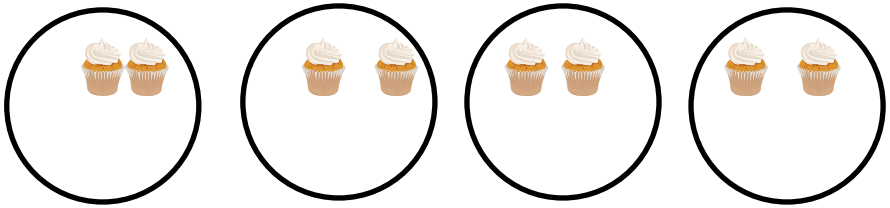
MULTIPLICATION

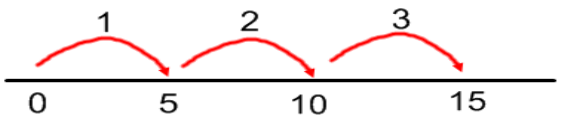
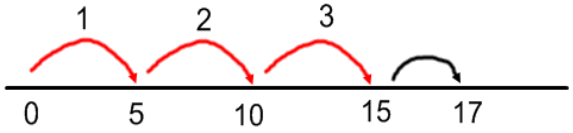
	Standard/ Comprehension	**Application**
EYFS	Children engage in a wide variety of songs and rhymes, games and activities. They solve problems, including doubling, halving and sharing. Children will experience equal groups of objects and work on practical problem solving activities involving equal sets or groups. The link between addition and multiplication can be introduced through doubling.	Use rhymes, songs and stories involving counting on and counting back in ones, twos, fives and tens. Real life contexts and practical concepts to count in repeated groups of the same size – how any wheels on 3 bicycles? How much money is 5 lots of 2p? How many legs on four ducks? Help children to understand that five fingers on each hand make a total of ten fingers altogether, or that two rows of three eggs in the box make six eggs altogether.
<u>Year 1</u>	Understand multiplication is related to doubling and combining groups of the same size (repeated addition) Children will experience equal groups of objects and will count in 2s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups. Pupils should be taught to solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays **with the support of the teacher.** Start to recognise x symbol and record multiplication using x and =	*Repeated addition with objects, arrays and pictorial representations. In year one children will be exposed to many different multiplication based activities in a variety of contexts. Much of this will be repeated addition activities or be linked to counting in 2s, 5s or 10s.* Group large numbers of objects in 2s, 5s, 10s Count individual objects/count on fingers. Use cubes, counters, pictures/symbols of every object to arrive at total. There are 3 marbles in a bag. How many marbles are there in 4 bags?  4 x 3 = 12  3 rows of 2 ***or*** 2, 3 times 3 x 2 ***or*** 2 x 3 = 6

Year 2	Recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot Solve problems involving multiplication using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts. Use an appropriate method to solve multiplication word problems (fluency), reasoning and problem solving activities. Using understanding of the invers and practical resources to solve missing number problems. *Vocabulary: multiply, multiplication, multiple, times, lots of, groups of, rows of, repeated addition, array, 10 times…*	*To be able to understand multiplication as repeated addition.* *5 x 2 = 5 lots of 2* *2 + 2 + 2 + 2 + 2 = 10* *3 times 5 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x 3* Children should be able to model a multiplication calculation using an array. XX XX XX 3 x 2 = 6 *or* 2 x 3 = 6 **3 rows of 2** **2,three times** XXXXX XXXXX XXXXX XXXXX 4 x 5 = 20 *or* 5 x 4 = 20 **4 rows of 5** **5, four times** To be able to understand multiplication as repeated addition using a number line. 4 × 5 = 20 4 jumps of 5 = 20 +5 +5 +5 +5 0 5 10 15 20 To be able to derive multiplication facts for the 2, 5 and 10 times tables and begin to derive related division facts. 6 x 2 = 12 2 x 6 = 12 12 ÷ 6 = 2 or 12 ÷ 2 = 6

DIVISION

	Standard/ Comprehension	**Application**
EYFS	Children engage in a wide variety of songs and rhymes, games and activities. They solve problems including halving and sharing. Children will work on practical problem solving activities involving grouping and sharing. Division can be introduced through halving.	Real life contexts and practical concepts to share and group:  I have 10 sweets and I want to share them with my friend. How many will we have each? Sharing objects between children – is it fair? Start by *practically* sharing objects out equally to work out how many each child gets. I have 12 strawberries to share equally between 4 children - 
<u>Year 1</u>	Understand division is related to halving. Children will understand equal groups and share items out in play and problem solving, counting in 2s, 10s and later in 5s. Group AND share small quantities- understanding the difference between the two concepts.	To be able to understand the concept of division as sharing. Sharing develops importance of one-to-one correspondence. Share/group practically: 12 objects between 3 plates 

	Pupils should be taught to solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays **with the support of the teacher.** Start to recognise ÷ symbol and record division number sentences using ÷ and =	There are 6 sweets, how many people can have 2 sweets each?  To be able to represent problems using pictures and symbols. e.g. 6 ÷ 2 is the same as 6 sweets shared between 2 people, how many do they each get?  or  6 ÷ 2 = 3
Year 2	Recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers Calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot Solve problems involving division using materials, sharing, grouping, mental methods and division facts, including problems in contexts.	Sharing equally:  To be able to understand the concept of division as grouping. To be able to represent problems using pictures and symbols. e.g. 8 ÷ 2 is the same as 8 objects put into groups of 2  XX XX XX XX 8 ÷ 2 = 4

	Use an appropriate method to solve division word problems (fluency), reasoning and problem solving activities. *Vocabulary:* *divide, division, divided by, share, sharing, shared between, grouping, put into groups of, equal, how many, remainder*	Grouping using number line 15 ÷ 5 = 3  Inverse of multiplication and knowledge of tables. To be able to complete number sentences where the missing number is shown by a symbol. □ ÷ 2 = 4 20 ÷ △ = 4 □ ÷ △ = 4 Finding a remainder 17 ÷ 5 = 3 r 2 17 ÷ 5 = 3 r2 

Vicki Asquith
Updated April 2024.