SAINT MARY'S CATHOLIC PRIMARY ACADEMY

Mr J O'Connor – Head Teacher

CURRICULUM POLICY FOR CALCULATIONS

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Mission Statement

"We Value All in the Name of Jesus the Christ"

Introduction

The calculation methods for each of the four operations should be **well modelled, practised and applied in a variety of problem solving activities at each level.** This will ensure children have a depth of understanding, rather than being moved too quickly to the next level. It is equally important not to allow children to 'stick' at a level when they should be moving on. Children must be secure in concrete and pictorial methods before moving onto abstract. KS1 must focus on understanding number and basic operations before moving onto any kind of written method.

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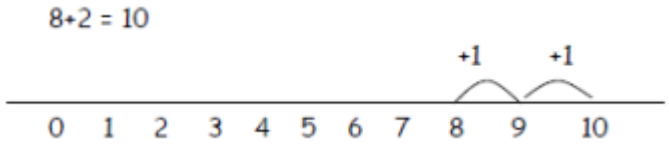
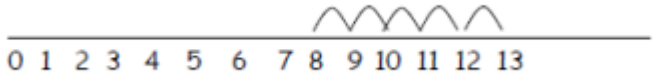
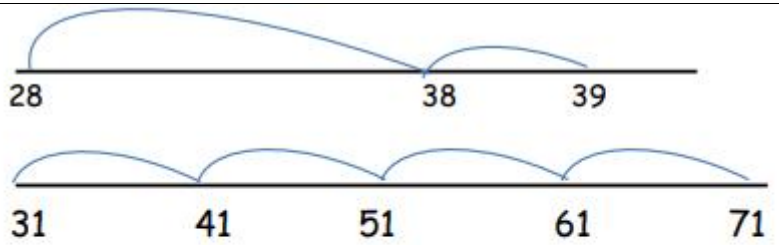
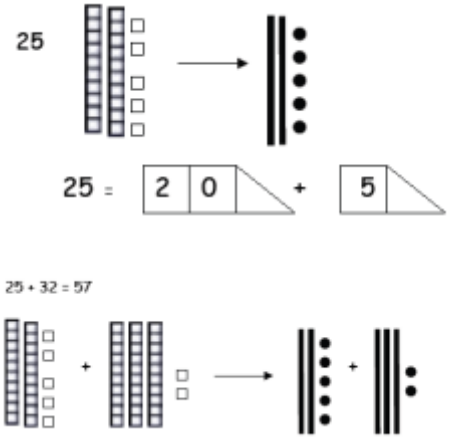
Addition Methods

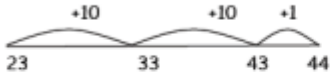
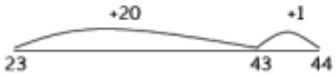
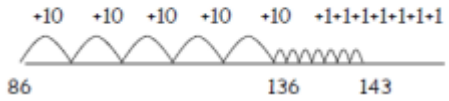
KS1	LKS2	UKS2
To count and add together sets of real objects and pictures.	To add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction.	To add and subtract whole numbers with up to 5 digits, including using formal written methods.
• Children should handle, group and add real objects and pictures and count aloud. 3+2 = 5  OR 	• Extend to adding three 2-digit numbers, two 3-digit numbers and numbers with different numbers of digits. 42 + 23 + 14 = 89 37 + 12 + 26 = 75 (1) 68 + 35 + 14 = 117 (11) 243 + 146 = 389 364 + 237 = 601 (11)	• Extend to adding numbers up to 5 digits and numbers with different numbers of digits. 52243 + 11156 = 63399 64364 + 31237 = 95601 (11) 32865 + 28327 = 61192 (11 1) 62431 + 14324 + 21134 = 97889 32855 + 28327 + 25413 = 86595 (11 1)

To add one or several more onto a number line.	To add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.	
• Children should have lots of practice counting along a number line, and then using it to add one more, and then several more.  	• Extend to adding numbers up to 4 digits and numbers with different numbers of digits. 2243 + 1156 = 3499 4364 + 1237 = 5601 11	
To be able to add through 10, some children bridging through 10.		
• Children should practise adding one and then several, so that the answer is ten and then beyond.  		
To know that addition can be done in any order. Use knowledge by starting with the biggest number.		
• Children should practise adding numbers in any order and be allowed to discover that numbers can be added in any order to reach the same answer.		

• Children should be taught to begin with the biggest number and add smaller ones on. • Children should be taught to spot number bonds to ten and add those first. 3+9=9+3 = 12 3+7+2=7+3+2 = 10+2 = 12		
To be able to add 10 to any number up to 100. To be able to add multiples of 10 to any number to up 100. To be able to add 11 or 21 to a 2-digit number up to 100. To be able to add 9 or 19 to a 2-digit number by adding 10 or 20 and subtracting 1.		
• Children should be supported in their understanding by using a number line, 100 square or other appropriate apparatus. • Children add 10 and then 1, or 20 and then 1 to a 2-digit number. • Children add 10 and then subtract 1, or 20 and then subtract 1 to a 2-digit number. • Children should be given plenty of practice leading to them being able to calculate mentally.		

 56+19  45+11 = 56 24 25 26 27 28 34 35 36 37 38 44 45 46 47 48 54 55 56 57 58 64 65 66 67 68 45+11 = 45+10+1 = 55+1 = 56 45+21 = 45+20+1 = 65+1 = 66		
To be able to partition 2-digit numbers. To be able to add two 2-digit numbers using practical partitioning.		
• Children will partition 2-digit numbers by practical partitioning into tens and ones, then drawings to represent, and arrow cards. • Children add two 2-digit numbers by practical partitioning into		

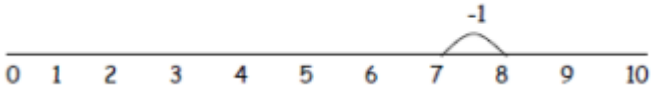
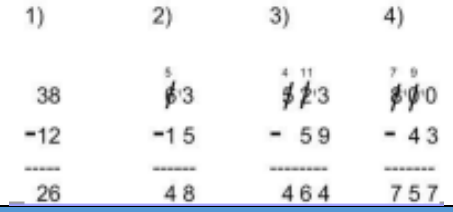
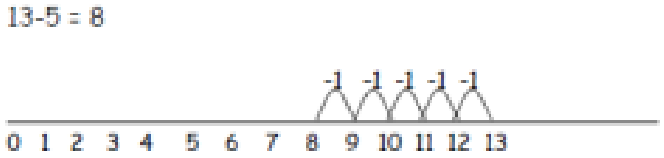
tens and ones, then drawings to represent.  		
To be able to add two 2-digit numbers on an empty number line.		
• Children place one of the two 2-digit numbers onto an empty number line and add the second by jumps of ten, and then by jumps of ones. • Extend to adding multiples of ten and jumps of ones to the next multiple of 10.		

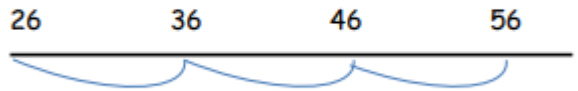
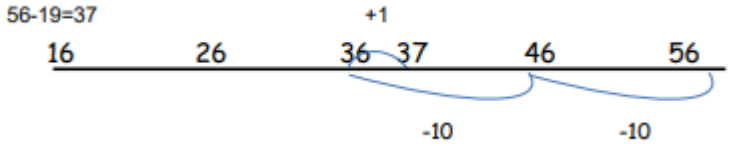
23 + 21 = 44   48 + 36 = 8  		
To be able to add two 2-digit numbers which have a total larger than 100 on an empty number line. To be able to add two 2-digit numbers which have a total larger than 100 by partitioning.		
• Children place the larger of two 2-digit numbers onto an empty number line and add the second by jumps of ten, and then ones. 86+57 = 143  • Children partition both 2-digit numbers into their respective tens and ones, add each part separately, and recombine to find the answer.		
To add numbers using formal column methods.		

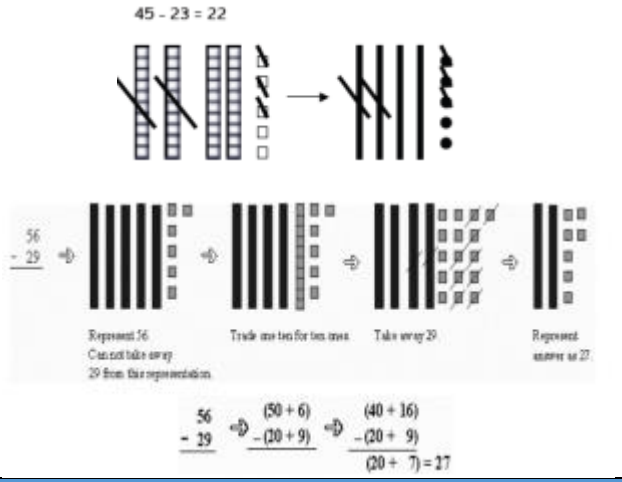
• In this method, recording is reduced further. Exchanged digits are recorded below the line, using the words "exchange one ten" or "exchange one hundred", rather than "exchange one". • Later, extend to adding three 2-digit numbers, two 3-digit numbers and numbers with different numbers of digits. $\begin{array}{r} 47 \\ +\ 76 \\ \hline 123 \\ \scriptstyle 11 \end{array}$ $\begin{array}{r} 258 \\ +\ 87 \\ \hline 345 \\ \scriptstyle 11 \end{array}$ $\begin{array}{r} 366 \\ +458 \\ \hline 824 \\ \scriptstyle 11 \end{array}$ Column addition remains efficient when used with larger whole numbers and decimals. Once learned, the method is quick and reliable.		

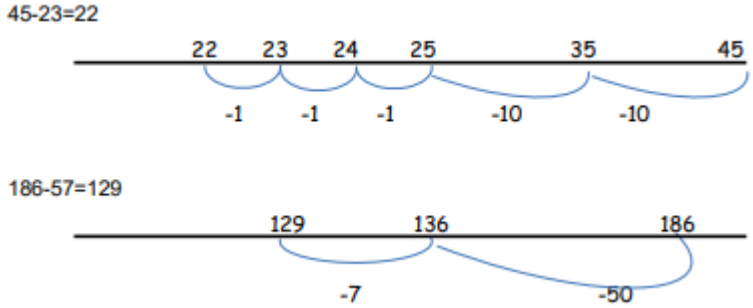
Subtraction Methods

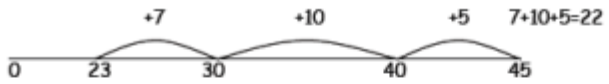
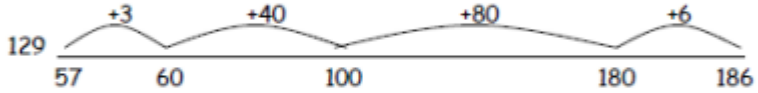
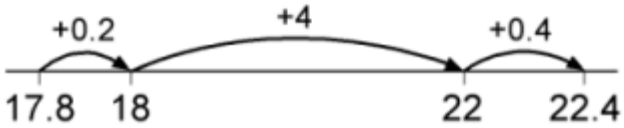
KS1	LKS2	UKS2
To be able to subtract real objects.		
• Children should handle and practise taking away real objects and pictures. 		
To be able to find one less on a number line.	To subtract using column subtraction.	
• Children should have lots of practice of placing a number on a number line, and then using it to find one less by jumping one place back.	• Recording is reduced further. When decomposition is necessary, the altered numbers are shown above	

8-1 = 7  	the actual numbers. • Extend to subtracting 2-digits from 3-digits and numbers with different numbers of digits.  	
To be able to subtract through 10, some children bridging through 10.		
• Children should have lots of practice placing a number greater than 10 on a number line and counting back, subtracting one at a time.  		
To be able to subtract 10 from any number up to 100. To be able to subtract multiples of 10 from any number up to 100. To be able to subtract 11 or 21 from a 2-digit number up to 100.		
• Children should subtract 10 from 2-digit numbers using a 100-square or number line. Children could confirm their understanding by counting on to check their result. • To subtract 11 or 21 - Children should locate the bigger		

number and first subtract 10 or 20, and then 1. Children could confirm their understanding by counting on to check their result. • Eventually, this will be done mentally. 56-32=24  34-10 = 24 2 3 4 5 6 12 13 14 15 16 22 23 24 25 26 32 33 34 35 36 42 43 44 45 46 52 53 54 55 56		
To be able to subtract 9 or 19 from a 2-digit number by subtracting 10 or 20 and adding 1.		
• Children should locate the bigger number then subtract 10 or 20 and then add 1. Children could confirm their understanding by counting on to check their result. • Eventually, this will be done mentally. 56-19=37  		

This can also be done using a 100 square.		
To be able to subtract two 2-digit numbers by practical partitioning into tens and ones.		
• Children will partition 2-digit numbers by practical partitioning into tens and ones using Base 10 equipment, then drawings to represent. • Extend to practical partitioning and subtraction where exchange of a 10 for 10 ones is necessary. 		
To be able to subtract two 2-digit numbers by counting back on an empty number line.		
• Children place the bigger of the two 2-digit numbers onto an empty number line and subtract the second by jumps of ten, and then ones. • Extend to subtract a 2-digit number from a 3-digit number.		

		
To be able to subtract two 2-digit numbers, finding the difference by counting up on an empty number line.		
• Children place the number to be subtracted onto an empty number line and count up to the bigger number by jumping to the next multiple of ten, and then up in tens, and then in one jump to the required amount of ones in the higher number. • Children should record this process systematically. • Extend to adding two 2-digit numbers, and then two 3-digit numbers and numbers with different numbers of digits. • Extend to adding decimals where no more than 3 columns would be needed.		

45-23= 22  186 - 57 = 129  40+80 = 120 3 + 6 = 9 120 + 9 = 129  		
To be able to subtract two 2-digit numbers using partitioning.		
• Children partition both 2-digit numbers into their respective tens and ones, subtract each part separately, and recombine to find the answer.		

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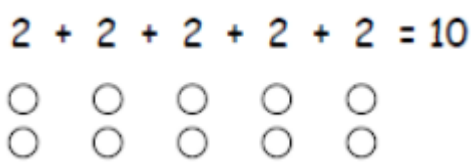
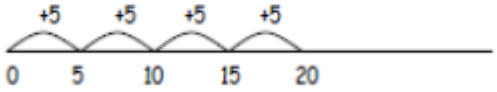
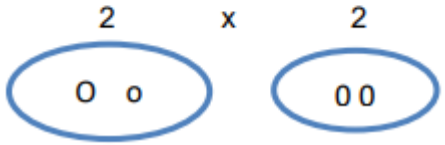
Multiplication Methods

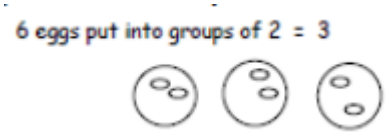
KS1	LKS2	UKS2
To be able to practically count repeated groups/sets of the same size. To count mentally in 2s, 5s and 10s. To use objects to work out repeated addition.	To multiply using the short multiplication method.	To find the product of two 2-digit numbers.
• Children should have lots of practice of addition of the same number of objects (or the numbers themselves) repeatedly. • Children to use objects or draw. 	• Children should have lots of practice using column addition and subtraction before using short multiplication.	• Children should have lots of practice finding the product of two 2-digit numbers using the methods they have previously learned.
To relate repeated addition to multiplication.		
• Introduce multiplication symbol. • Children should practise recording repeated addition and relate to multiplication. • Children need to know how this is represented on a number line.		

5 + 5 + 5 + 5 = 20 4 x 5 = 20  		
To multiply using arrays.	To multiply 2-digits by 1-digit using short multiplication.	To find the product of two 2-digit numbers.
• Children should be able to display multiplication as an array and be able to discuss that this shows 4 lots of 5, or 5 lots of 4. 4 x 5 = 20 5 x 4 = 20  OR  	• Recording is reduced further, with exchanged digits recorded below the line. • If, after practice, children cannot use the compact method without making errors, they should return to the expanded format of stage 3. 2 4 × 6 1 4 4 2	• Recording is reduced further. • The aim is for most children to use this long multiplication method for 2-digits multiplied by 2-digits by the end of Year 5. 56 × 27 is approximately 60 × 30 = 1800. 56 X 27 392 56 x 7 1120 56 x 20 1512 1
To count mentally in 3s and 4s. To be able to fluently recall 2, 5 and 10 times tables and division facts. To practice multiplication problems with missing numbers.		
• Children need lots of oral practice and		

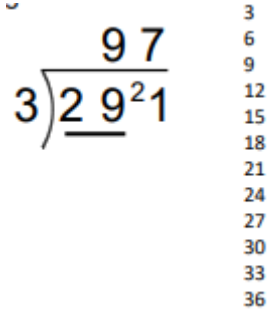
are able to record on paper. • Begin to introduce corresponding division facts.		
To build families of number facts.		
• Children to learn remaining tables and build families of number facts. • Introduce inverse operations. 3 x 5 = ? ? ÷ 3 = 5 3 x ? = 15 15 ÷ 3 = ? ? x 5 = 15 15 ÷ 5 = ?		

Division Methods

KS1	LKS2	UKS2
To be able to half numbers to 20 – practically and eventually mentally. To be able to divide practically by sharing.	To practise division problems with missing numbers.	To divide 3-digits by 2-digits, using 'Expanded' method, with no remainder.
• Children should have plenty of practice, practically sharing a variety of objects between 2, and then bigger numbers of groups. 6 eggs shared between 2 nests = 3 	• Children need lots of oral practice and to be able to record on paper. ? ÷ 3 = 5 15 ÷ 3 = ? 15 ÷ 5 = ?	• 'Short' division of 3-digits ÷ 2-digits can be introduced as an alternative, more compact recording. • For most children this will be at the end of Year 5 and the beginning of Year 6.

		0 3 3 15) 4 9 45 15 30 45 4 49
To be able to divide practically by grouping.		To divide 3-digits by 2-digits, using 'Expanded' method, with a remainder.
• Children should have plenty of practice making different groupings, starting with a small number and increasing to larger numbers of objects. 		0 4 2 r2 15) 6 3 3 2 15 30 45 60 3 63
To relate sharing and grouping to the division symbol.	To carry out short division of 2-digits by 1-digit.	To divide 3-digits by 1-digit using 'Expanded' method, including decimals.
• Children should have plenty of practice relating their practical experience to the written representation, using the division symbol. 6 eggs put into groups of 2 = 3 6 ÷ 2 = 3	• Short division of 2-digits by 1-digit can be introduced as a more compact recording of the mental method of partitioning. • Short division of a 2-digit number can be introduced to children who are confident with multiplication and division facts and with subtracting multiples of 10	• In Year 6, answers are to be given as a fraction or decimal rather than remainders.

	mentally, and whose understanding of partitioning and place value is sound. • For most children, this will be at the end of Year 4 or the beginning of Year 5. This is then shortened to: $\begin{array}{r} 2\ \ 7 \\ 3\overline{)8\ {}^{2}1} \end{array}$	$\begin{array}{r} 0\ 4\ .\ 2\ r2 \\ 15\overline{)6\ 3\ .{}^{3}2} \end{array}$ 15 30 45 60 (3) 63 $\begin{array}{r} 0\ 4\ 1\ .\ 6\ r2 \\ 12\overline{)4\ 9\ {}^{1}9\ .{}^{7}4} \end{array}$ 12 (7) 19 24 36 48 (1) 49 60 72 (2) 74

To relate division to multiplication using arrays.	To carry out short division.	
• Children should be able to recognise arrays as being the physical representations of multiplication facts, and be able to verbalise them. For example, 18 ÷ 6 = 3 could be discussed as 18 shared into 6 groups or “How many lots/groups of 3 in 18?” 6x3=18  3x6=18 18÷6=3 18÷3=6	• Children who have a secure knowledge of multiplication facts and place value should be able to move on quickly to the more efficient recording recording.  3 6 9 12 15 18 21 24 27 30 33 36	$\begin{array}{r} 7 \\ 17\overline{)123456.} \\ -119 \\ \hline 44 \end{array}$ $\begin{array}{r} 72 \\ 17\overline{)123456.} \\ -119 \\ \hline 44 \\ -34 \\ \hline 105 \end{array}$ $\begin{array}{r} 726 \\ 17\overline{)123456.} \\ -119 \\ \hline 44 \\ -34 \\ \hline 105 \\ -102 \\ \hline 36 \end{array}$ $\begin{array}{r} 7262.1 \\ 17\overline{)123456.0} \\ -119 \\ \hline 44 \\ -34 \\ \hline 105 \\ -102 \\ \hline 36 \\ -34 \\ \hline 20 \end{array}$ $\begin{array}{r} 7262.11\ldots \\ 17\overline{)123456.00} \\ -119 \\ \hline 44 \\ -34 \\ \hline 105 \\ -102 \\ \hline 36 \\ -34 \\ \hline 20 \\ -17 \\ \hline 30 \end{array}$