Reviewed - January 2015
Review date – January 2017

St Joseph's Catholic Primary School Calculations Policy

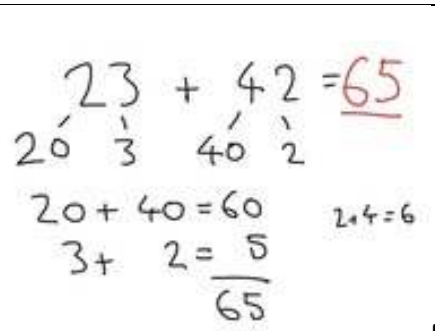
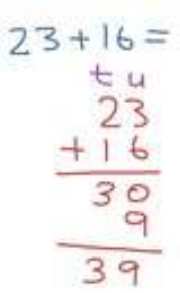
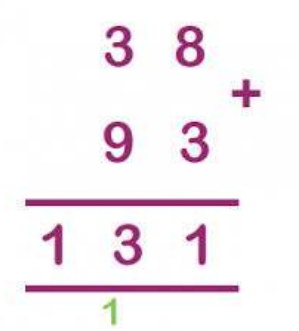
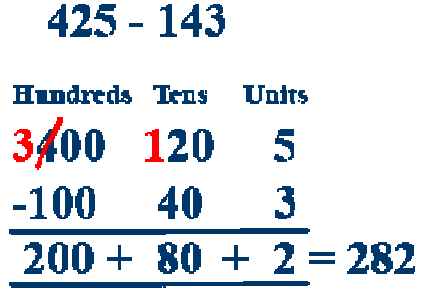
The following resources are used to support the teaching and learning of addition, subtraction, multiplication and division throughout the school:

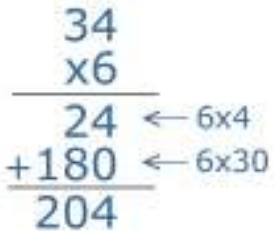
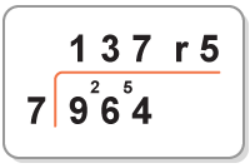
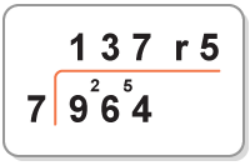
Addition	Subtraction	Multiplication	Division
Cubes and other practical objects Counting beads Number lines Empty number lines Hundred squares Rods of tens and units	Cubes and other practical objects Counting beads Number lines Empty number lines Hundred squares Rods of tens and units	Cubes and other practical objects Beaded number lines	Cubes and other practical objects Beaded number lines

Calculations in the Early Years Foundation Stage

	Nursery	Reception
Addition	Counting forwards Counting groups of objects and understanding that the last number said is the total.	Grouping objects together. Children learn the vocabulary of adding. E.g., more, total, altogether. Children have lots of practical opportunities to add. Children begin to mentally recall one more.
Subtraction	Counting backwards. Counting objects when some have been removed.	Children learn the vocabulary of subtracting. E.g., left, less than. Children have lots of practical opportunities to subtract. Children begin to mentally recall one less.
Multiplication and division	Children are taught to share fairly.	Children have lots of opportunities to make groups and share with practical objects.

Written Methods

Addition	
EYFS	3 + 2 = 5
KS1	 Partitioning
LKS2	 Extended column method
UKS2	 Efficient column method
Subtraction	
EYFS	7 – 1 = 6
KS1	98 – 43 = 98 – 40 – 3 = 55 Partitioning
LKS2	 Extended column method

UKS2	 Efficient column method
Multiplication	
KS1	7 X 10 = 70
LKS2	 Extended column method
UKS2	 Efficient column method
Division	
KS1	50 ÷ 5 = 10
LKS2	 Bus stop method focusing on place value
UKS2	 Efficient bus stop method where the working out is done mentally

Addition at KS1

Counting forwards and backwards	(single digit) + (single digit) e.g. 4+8 (double digit) + (single digit) e.g. 13+4 Begin using a labelled number line and then progress to a blank number line Encourage children to see the patterns and relationships with numbers and therefore use known facts. In Year 2, children must be shown relationship between +/- inverses
Re-ordering	Putting largest number first e.g. 2+7 becomes 7+2 or 5+13 becomes 13+5. 2+36 becomes 36+2 Grouping number bonds to 10 3+4+7 = 7+3+4 Begin talking to children about finding the most efficient methods to use.
Compensating	This is particularly useful when adding numbers that are near-multiples of 10. 5+9 = 5+10-1 34+9= 34+10-1 52+21= 52+20+1 By using a number line in the early stages of this method it should help children avoid the confusion of whether to add one more or subtract one more when compensating later.
Using near doubles	This strategy can be used when adding numbers that are very close to one another Year 1 - 5+6 = double 5 +1 or double 6 -1 Year 2 – 40 + 39 = 40 + 40 - 1
Partitioning and using multiples of 10	Children need to know that numbers can be partitioned into tens and ones e.g. 25 = 20 + 5 Children are taught to add two two-digit numbers by partitioning the second number, adding the tens and then the units. E.g., 32 + 16 = 32 + 10 + 6 Children are also taught to 'bridge' multiples of 10. E.g., 34 + 8 = 34 + 6 (as 40 is the next multiple of ten) + 2
Partitioning and using numbers other than ten	Children are taught that finding the next multiple of ten is not appropriate when solving problems involving weeks, months, seconds, minutes, hours and days.

Addition at LKS2

Counting forwards and backwards	Counting on in tens from any number 67, 77, 87, 97 … Counting on in hundreds from any number 101, 201, 301, 401 …
Re-ordering	Putting the largest number first so there is a smaller step to count on. 23 + 56 becomes 56 + 23
Partitioning and using multiples of 10 and 100	Use place value knowledge and images to support this and encourage children to see that when adding or subtracting by a multiple of 10, the ten column is the only one affected. 45 + 26 = 45 + 20 + 6 When adding, children are encouraged to look for the multiples of ten and 'bridge' them by adding to them first and then adding beyond. E.g., 37 + 25 = 37 + 3 (to 40) + 2
Partitioning and using multiples other than 10 and 100	Children are taught that bridging through ten is not appropriate when solving problems involving time. E.g., when answering questions such as, it is 8.40 now, how long until it is 9.30?' children are taught to bridge through 60 by using clock faces and empty number lines.
Compensating	This is particularly useful when adding numbers that are near multiples of 10. E.g., 37 + 39 becomes 37 + 40 - 1
Using near doubles	This is useful with numbers that are very close to each other E.g., 140 + 130 = 140 + 140 = 10 48 + 47 = 50 + 50 – 2 - 3

Addition at UKS2

Counting forwards and backwards	Counting forwards and backwards in fractions and decimals frequently as part of the warm-up of the Numeracy lesson.
Re-ordering	Children are encouraged to look for relationships between numbers, doubles and number bonds to 10, 100, 1000. When using decimals, find pairs of numbers that make a whole number. Putting the largest number first as a more efficient method of adding.
Partitioning and using multiples of 10	Children are encouraged to use their knowledge of place value to partition into thousands, hundreds, tens, units and tenths. The emphasis is on breaking numbers apart to aid quick mental addition. 43+28+51 = 40+20+50+3+8+1 5.6+3.7 = 5.6+3+0.7

Compensating	138 + 69 = 138 + 70 - 1 Children are encouraged to build on their prior experience of compensating with whole numbers and given opportunities to compensate with decimals and fractions. $2.5 + 1\frac{3}{4} = 2\frac{1}{2} + 2-\frac{1}{4}$
Using near doubles	Children build on their prior knowledge of using near doubles with whole numbers and apply this to decimals and fractions. E.g., 1.5+1.6 = D1.5 + 0.1 or D1.6 - 0.1 3.6+3.8 = D3.5+0.1+0.3 or D3.6+0.2
Partitioning Bridging through numbers other than ten	Children are taught that bridging through ten is not appropriate when solving problems involving time. Children need to develop the ability to bridge through 60 and 24 and to know when it is appropriate. It is 10.45 how many minutes to 13.20?

Subtraction at KS1

Counting forwards and backwards	Counting on and back in ones from 0. Children are then taught to count on and back in 1s, 2s, 3s and 10s from any number.
Re-ordering	Children are taught that subtraction cannot be re-ordered.
Partitioning and using multiples of 10 and 100	Children are taught to break numbers into tens and units. E.g., 56 = 50 +6 Children are taught to apply this when they are subtracting two-digit numbers 67 – 32 = 67 – 30 – 2 Children are also taught to 'bridge' multiples of 10. E.g., 67 – 8 = 67 – 6 (as 60 is the multiple of 10) - 2
Partitioning and bridging through numbers other than multiples of 10	Children are taught that bridging through 12/24 is appropriate when solving problems with time. They will answer questions such as: 'It is half past seven, what time was it three hours ago?'
Compensating	Children are taught to round numbers to the nearest 10 before they can compensate. Compensating is particularly useful when numbers are near multiples of 10. E.g., 59 – 9 = 59 – 10 + 1

Subtraction at LKS2

Counting forwards and backwards	Counting on and back in 10s and 100s. Counting on and back starting from any number in jumps of 3, 4, 5.
Re-ordering	Children are taught that sometimes re-ordering is appropriate, particularly when it is easier to subtract to a multiple of 10, but at other times it is not appropriate. 12 – 9 – 2 = 12 – 2 – 9
Partitioning and using multiples of 10 and 100	Children build on their prior knowledge of place value – breaking numbers into hundreds, tens and units. 68 – 32 = 68 – 30 – 2 365-40 = 300+60-40+5 Children are also taught to 'bridge' through multiples of ten. E.g., 55 – 17 = 55 – 5 (as 50 is the nearest 10) – 10 – 2.
Partitioning and bridging through numbers other than 10	Children are taught to bridge through 12/24 when solving time problems, such as, 'it is 1.15, what time was it 45 minutes ago?' Children are provided with blank number lines and clock faces to support their skills.
Compensating	The number to be subtracted is rounded to the nearest multiple of 10 and then the difference is added or subtracted after the calculation. 39 – 21 = 39 – 20 – 1 64-19 = 64-20+1

Subtraction at UKS2

Counting forwards and backwards	Counting on and back in hundreds, fractions and decimals as part of the warm-up to the maths lessons to help the children to solve calculations such as 3.6 - 2.4 = Know that they can also count on when the numbers are close together. E.g., 5.7 – 4.9 =
Re-ordering	Giving the children a string of numbers to add mentally and encouraging them to look for bonds to 10, 100, doubles, near doubles or numbers which can be split to make bonds or landmark numbers; will help them practise this skill. Pupils learn that it is worth looking at all the numbers to see if there are pairs that subtract to multiples of ten. Reordering gets children looking at numbers and analysing how they are best used. 8.7+5.6-6-7 = 8.7-6.7+5.6 4.8+2.5-1.8 = 4.8-1.8+2.5
Partitioning and using multiples of 10 and 100	Children use their prior knowledge of place value to separate numbers into hundreds, tens, units and tenths to help them when subtracting with decimals. This helps the children to subtract efficiently and also increases the speed of their mental subtraction.

	E.g., 4.7-3.5 = 4.7-3-0.5 Children are also taught to 'bridge' through multiples of ten and then subtract what is left. This is particularly useful when solving money problems involving subtraction. E.g., 187 – 59 = 187 – 7 (as 180 is the nearest 10) – 50 – 2 Empty number lines are used to illustrate this.
Partitioning through numbers other than multiples of 10	This is particularly relevant when solving problems involving time as children are taught to bridge through 12, 24 and 60. E.g., 'It is 11.30. How many minutes until 15.40?'
Compensating	The number to be subtracted is rounded to the nearest multiple of to make the calculation more straightforward. The single-digit numbers are then replaced after the calculation. E.g., 405-399 = 405-400+1 Children then apply their knowledge of compensating to subtracting decimals by rounding to the nearest whole-number. E.g., 5.7-3.9 = 5.7-4+0.1

<u>Multiplication at KS1</u>

Knowing facts	Counting in 2s, 3s, 5s & 10s Instant recall of multiplication and division facts is a key objective in developing pupils' numeracy skills. But learning them and being fluent at recalling them quickly is a gradual process that takes place over time. To ensure that children fully understand multiplication, they have the opportunity to work out the facts and see multiplication visually.
Using multiples	Children count in 2s, 3s, 5s and 10s. They are taught to recognise the multiples of these times tables. Children are taught that multiplication can be done in any order. E.g., 5 x 10 = 10 x 5 Children are taught the pattern that is created when multiplying any number by ten.
Doubling and halving	Children learn to recall the double facts to double 10 and the halves for all even numbers to 20. Children are taught that doubling is the inverse of halving.
Arrays	Children are taught to understand multiplication through visual representation. By looking at arrays, they understand that multiplication facts come in pairs. E.g., 3 x 4 = 12 and 4 x 3 = 12
Multiplication by a single digit	Children are given opportunities to explore multiplication by making groups to ensure that they fully understand it.

Multiplication at LKS2

Knowing facts	Know by heart the multiplication and division facts for all times tables up to 10 x 10 Counting forwards and backwards in all numbers up to 12. Arranging counters in rectangular arrays not only helps children to develop their understanding of multiplication facts but also gets them thinking about and learning the factor pairs for each number.
Using multiples of 10	Being able to multiply by 10 and multiples of 10 depends on an understanding of place value. 4x60 79x100 351x10
Multiplication by a single digit	Reinforce multiplication facts Use facts to partition numbers to make calculation more efficient. E.g., 6x7 = 6x (2 + 5) = 6x2 + 6x5
Multiplication by a two-digit number	Using the facts that they do know to draw out and then work out the part that they don't yet know. Number lines allow them to do this and then see the bit that they have to work out. Children will need knowledge of other methods to draw on such as doubling or factors. 13x9 32x3
Doubling and halving	Children are taught to double two-digit numbers by using their double facts for single digits and their place value. Identify double of 2 digit numbers. Use these to work out doubles of multiple of 10 and 100 and corresponding halves. Larger numbers might need to be partitioned before doubling facts can be applied. This process may well be done mentally also or with jottings. E.g., 14x5 = 14x10÷2 12x20 = 12x2x10 60x4 = 60x2x2
Fractions, decimals and percentages	Find fractions of whole amounts. E.g., one-third of 18. Find half of 9 = $4\frac{1}{2}$ Know 0.5 is $\frac{1}{2}$. Knowing equivalent decimals and fractions. 0.5, 0.25, 0.10, 0.01.

Multiplication at UKS2

Knowing facts	Recall quickly all multiplication facts to 12x12 Using facts to derive square of numbers to 12x12 and corresponding sq of multiples of 10. 40x40 = 160
Using multiples of 10	Children are taught to use their place value to work out multiplications such as: 600 X 7 = 23x50 = 637.6x10 = Also, children are taught to apply their multiplication facts for the five times table to multiply by 0.5 etc.
Multiplication by a single digit	428x2 0.7x3 8.6x6 2.9x9 Make use of factors when multiplication so 7x6 is seen as 7x3x2 Refer children to the knowledge that they have and can surmise from the facts they already know and apply these to other facts such as decimals.
Multiplication by a two-digit number	47x5 = (40x5) + (7x5) Being able to partition numbers into manageable chunks or being able to locate factors which can be worked out are method which the confident mathematician can use. Children begin to use written methods but they are encouraged to still check for relationships between numbers.
Doubling and halving	Derive double and halves of decimals. eg Double 6.5 Double 2.7 $\frac{1}{2}$ of 5.6 Relating known fact again to support another method. Children must be secure in their knowledge of place value and the relationship between the numbers.
Fractions, decimals and percentages	Children are taught to work out fractions, decimals and percentages of numbers. For example, 20% of 50, $\frac{3}{4}$ of 120 and 0.6 of 10.

Division at KS1

Doubling and halving	Children are taught the doubles of numbers to double ten and then the corresponding halves. This is taught practically first and then children begin to mentally recall the facts.
Sharing	Before children can begin to recall division facts, they have plenty of time to share objects into groups. This helps them to fully understand the concept of division. At the end of Year 2, children are taught to divide with remainders.
Knowing facts	By counting forwards and backwards in 2s, 3s, 5s and 10s, children begin to recognise the multiples of these numbers and then begin to mentally recall the division facts. Children learn that multiplication is the inverse of division and use this to solve calculation such as: 5 X 3 = 15 15 ÷ 3 = 5

Division at LKS2

Knowing facts	2,3,4,5 and 10 and 11 tables and the corresponding division facts. Pupils need a great deal of practice to know facts by heart. It is crucial that practice involves as wide a variety of activities as possible, such as playing matching games. In Year 4 – children recall all multiplication facts up to 10x10 and corresponding division facts. Arranging counters in rectangular arrays not only helps children to develop their understanding of multiplication facts but also gets them thinking about and learning the factor pairs for each number.
Using multiples of 10	Being able to divide by 10 and multiples of 10 depends on an understanding of place value. This ability is fundamental to being able to multiply and divide larger numbers, such as: 700÷100 300÷10
Division by a single digit	Children use known multiplication and division facts. Once pupils are familiar with some multiplication and division facts, they can use these facts to work out others. In Year 4 – children use facts to partition numbers to make calculation more efficient. E.g., 48 ÷ 4 = 40 ÷ 4 + 8 ÷ 4
Doubling and halving	Halving multiples of 10 to 100. e.g ½ of 20 ½ of 30 This relies on children being secure in their place value and knowledge of tens and units. In Year 4 - Using halving as a strategy where appropriate. 60÷4 = 60÷2÷2 Identify halves of 2 digit numbers. Use these to work out halves of multiple of 10 and 100 and corresponding doubles. Larger numbers might need to be partitioned before halving facts can be applied. This process may well be done mentally also or with jottings
Fractions, decimals and percentages	Find one third of 18, one tenth 20 and one fifth of 15. Finding 1/3 ½ 1/5 1/6 of 1/3 of 18 1/10 ¼ 1/10 of 20 1/5 of 15. Make sure they link these division facts to multiplication facts. In Year 4: Find half of 9 = 4½ Know 0.5 is ½ . Knowing equivalent decimals and fractions. 0.5, 0.25, 0.10, 0.01. Finding ½ of 150 ½ of 21.60

Division at UKS2

Knowing facts	Recall quickly multiplication facts to 10x10. e.g 6x7, 60x7 and 600x7 etc. use them to multiply pairs of multiples of 10x100. Derive corresponding divisional facts. Children should be encouraged to identify relationships between numbers. So knowing the division facts for 100 should help them to divide 1.0. In Year 6 - Use facts to derive square of numbers to 12x12 and corresponding square of multiples of 10. 40x40 = 160
Using multiples of 10	9900÷10 737÷10 2360÷100 This strategy relies on children having a secure understanding of place value. In Year 6, children divide decimals by 10, 100 and 1000 135.40÷100
Division by a single digit	Use partitioning as the main strategy when dividing mentally. 154÷2 (100 ÷ 2) + (50 ÷ 2) + (4 ÷ 2) = 72 Make use of factors when multiplication so 7x6 is seen as 7x3x2. Knowledge of factors will support and strengthen division. Refer children to the knowledge that they have and can surmise from the facts they already know and apply these to other facts such as decimals. 45.9÷9
Doubling and halving	Relating known facts to support another method. Children must be secure in their knowledge of place value and the relationship between the numbers. $\frac{1}{2}$ of 960 $\frac{1}{4}$ of 64 1.6÷2
Fractions, decimals and percentages	$\frac{1}{4}$ of numbers. 25% of 100 70% of 100cm $\frac{1}{2}$ of Find 17.5% of 5250 25% of 360 £71.30

Reviewed and updated January 2015
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