

Staplegrove Church School



Calculation Policy for Mathematics

(Adapted from Capturing Maths)



This policy has been designed to teach children through the use of concrete, pictorial and abstract methods. This calculation policy should be used to support children to develop a deep understanding of number and calculation.

Background

This policy has been created to develop number awareness and fluency for our children. The policy only details the strategies; teachers must plan opportunities for pupils to apply these; for example, when solving problems, or where opportunities emerge elsewhere in the curriculum.

Using the concrete-pictorial-abstract approach

Children develop an understanding of a mathematical concept through the three steps (or representation) of concrete-pictorial-abstract approach. Reinforcement is achieved by going back and forth between these representations.

Concrete representation

The enactive stage - a pupil is first introduced to an idea or a skill by acting it out with real objects. This is a 'hands on' component using real objects and it is the foundation for conceptual understanding.

Pictorial representation

The iconic stage - a pupil has sufficiently understood the hands-on experiences performed and can now relate them to representations, such as a diagram or picture of the problem.

Abstract representation

The symbolic stage - a pupil is now capable of representing problems by using mathematical notation, for example: $12 \div 2 = 6$.





+ =

Solving addition problems using concrete and pictorial images to include finding one more.



Reception Subtraction

Continue to explore the part - part - whole relationship Solving subtraction problems using concrete and pictorial images to include finding one less.

Taking away after counting out practical equipment. . Children would be encouraged to physically remove these using touch counting.



By touch counting and dragging in this way, it allows children to keep track of how many they are removing so they don't have to keep recounting. They will then touch count the amount that are left to find the answer.

Those who are ready may record their own calculations



Peter has 5 pencils and 3 erasers. How many more pencils than erasers does he have?







When subtracting using Dienes children should be taught to regroup a ten rod for 10 ones and then subtract from those ones	11 13 13 * 20 - 4 = 16 and 20 = 16	
Subtracting multiples of 10 Using the vocabulary of 1 ten, 2 tens etc alongside 10, 20, 30 Is very important here as pupils need to understand that it is a 10 not a 1 that is being taken away	40 = 60 - 20 38 - 10 = 28 Image: Second s	
Use a 100 square to show that when subtracting 10 the ones numbers stays the same. Consolidate that children no longer count along the rows.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 6 7 8 9 10 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 44 45 46 47 48 950 50 51 52 53 54 55 57 58 59 60 61 62 63 64 65 66 67 78 79 80 81 82 83 84 85 86 87 88 99 90 91 92 93 94 95 96 97 98 99 100	

Year 1 Multiplication	
Counting in multiples of 2, 5 and 10 from zero Children should count the number of groups on their fingers as they are	2 4 6 8 4 groups of 2 = 8
skip counting. Use concrete arrays	
When moving to pictorial/written calculations the vocabulary is important	two two two This image represents two
Solving multiplication problems using repeated addition	groups of 4 or 4 twice
Year 1 Division	
Pupils should be taught to divide through working practically and the sharing should be shown below the whole to familiarize children with the concept of the whole The language of whole and part part should be used Focus on sharing equally	10 ÷ 2 = 5 There are 8 cans. $8 \div 4 = 2$ There are 4 boxes of 2 cans.



Using concrete objects and pictorial representations to add 3 single- digit numbers	7+3+2 = leads to 10 + 2 =	
Using the bar to find missing digits. It is important for children to use the bar in this way to encourage the use of it to aid with problem solving	Helen has 14 bread- sticks. Her friend has 17. How many do they have altogether?	14 17 ? ? 14 17



Year 2 Multiplication	
Skip counting in multiples of 2, 3, 5, 10 from 0	3 more
Recall and use multiplication facts for the multiplication tables 2, 5 and 10	Image: Second secon
I can use multiplication (x) and equal (=) sign when writing out my times tables	
Multiplication is commutative Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer	How many dots are there? $ \begin{array}{c} \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$
Solve multiplication problems in context using arrays and repeated addition	3x5 = $5x3 = $ $3x5 = $ $5x3 = $ $3x5 = $ $5x3 = $ $3x5 = $ $5x3 = $ 5

	Year 2 Division
Recall and use division facts for the multiplication tables 2, 5 and 10	$10 \div 10$ • 5 $20 \div 10$ • 7 $70 \div 10$ • 2 $50 \div 10$ • 6 $60 \div 10$ • 1 $100 \div 10$ • 10
Solve division problems in context using concrete objects by sharing	There are 18 sausages. Put 18 sausages equally on 2 plates. There are 9 sausages on each plate. $18 \div 2 = 9$
Solve division problems in context using arrays	
I can solve division as grouping including finding unit fractions of length and amounts	Put 10 buns in groups of 2. How many plates are there? Image: Constraint of the constraint of













	Year 4 Multiplication
Children to know all times tables to 12 x 12. Ladder method to be used with children multiplying both two- and three-digits by a one-digit number.	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Multiplying using the bar.	A computer costs 5 times as much as a television. The television costs £429. Cost of the computer How much does the computer cost?
	Year 4 Division
Dividing up to three- digit numbers by a one-digit number using short division. Only when the children are secure with dividing a two- digit number should they move onto a 3- digit number.	H T U 3 3 6 3 6 5 1 2 2 6 5 1 2 2 6 6 0 6 0 0 6 0 6
Dividing using the bar.	Desmond and Melissa collect cards. They have 192 cards in all. Melissa has three times as many cards as Desmond. How many cards does Desmond have?
	192 D =? M M M

Year 5 Additio	Year 5 Addition		
£23.59 + £7.55 = £31.14	€23·59 +€7·55 €31·14		
23481 + 1362 = 24843	2 3 4 8 1 + 1 3 6 2 2 4 8 4 3		
19.01 + 3.65 + 0.7 = 23.36	$ \begin{array}{r} 1 & 9 & 0 \\ 3 & 6 \\ + 0 & 7 \\ 2 & 3 \\ \end{array} $		
This is not a form of getting the co children to the correct operation. MacDonalds sold £9957.68 worth of hamburgers and £1238.5 worth of chicken nuggets. How much money did they take altogether?	errect answer but helping to guide ? £957.68 £1238.5		
Year 5 Subtract	tion		
Subtract with decimal values, included decimals, aligning the decimal point. 33056 7056 2128 7056 28928 376 670 670 A whole family's trip to Lapland four. The Smiths have only save money do they still need? £500	ding mixtures of integers and Approximate Calculate Check Che		
	fear 5 Addition £23.59 + £7.55 = £31.14 23481 + 1362 = 24843 19.01 + 3.65 + 0.7 = 23.36 This is not a form of getting the co- children to the correct operation. MacDonalds sold £9957.68 worth of hamburgers and £1238.5 worth of hamburgers. How much money did they take altogether? Year 5 Subtract Subtract with decimal values, included decimals, aligning the decimal point. $\frac{3400566}{21288} = \frac{376}{676}$ A whole family's trip to Lapland four. The Smiths have only save money do they still need? £50		

Year 5 Multiplication		
Multiplying up to four digit numbers by two digits using long multiplication. Children need to be taught to approximate first, e.g. for 72 x 38 , they will use rounding: 72 x 38 is approximately 70 x 40 = 2800 , and use	$ \begin{array}{c} 56 \\ \times \ 27 \\ \overline{392} \\ 1120 \\ 1512 \end{array} $ (56×7) (56×20)	
the approximation to check the reasonableness of their answer.	Explain that first we are multiplying the top number by 7 starting with the ones (any carrying needs to be done underneath the numbers). Now explain that we need to put a 0 underneath (this is because we are multiplying the number by 20 or 2 tens which is the same as multiplying 10 by 2) Now add the 2 numbers together to give you the answer. This will need repeated modelling. $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	
Using the bar to support multiplication.	The cost to run a sports centre is £4375 a week, how much would it cost to run for 16 weeks?	
Year 5 Division		
Diving with up to four- digit numbers by one- digit including numbers where remainders are left.	0663r5 8)5 [°] 3 [°] 0 ² 9	
	Short division with remainders: Now that pupils are introduced to examples that give rise to remainder answers, division needs to have a real life problem solving context, where pupils consider the meaning of the remainder and <u>how</u> to express it, i.e. as a fraction, a decimal, or as a rounded number or value, depending upon the context of the problem.	
Using the bar to support division problems.	Bar Model to support understanding of problem solving: Frank has 4920 apples. He needs to put them into baskets of 40. How many baskets does he need?	

	Year 6 Addition
Adding several numbers with up to three decimal places.	Children need to be competent in a range of contexts, including measures and money, using a range of addition strategies. (see Year 5 for examples)
	Adding several numbers with different numbers of decimal places (including money and measures): 5 9 • 7 70 + 1 • 3 00 9 • 0 8 0 + 1 • 3 00 Empty decimal places should be filled with zero to show
Adding using the bar.	Jack went on holiday. His flight cost £70.50, the hotel £1295 and spending money £427.89. How much did Jack spend on his holiday? £70.50 £427.89 £1295
	Year 6 Subtraction
Subtracting with increasingly large and more complex numbers and decimal values.	Children need to be competent in a range of contexts, including measures and money, using a range of subtraction strategies. (see Year 5 for examples)
Using the bar for subtraction.	Chloe wants to buy a new car for £6450. She has £4885.87 in her savings account. Her Dad gives her £150 for her birthday. How much more money does she need to save?
	£4885.87 £150 ?

