SOUTH STANLEY INFANT AND NURSERY SCHOOL

Calculation Policy

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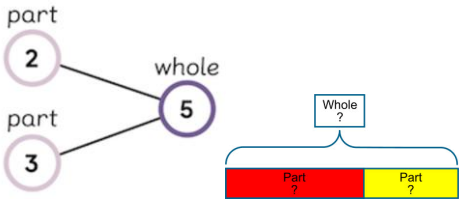
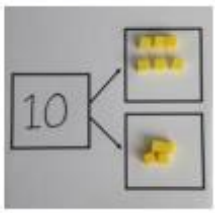
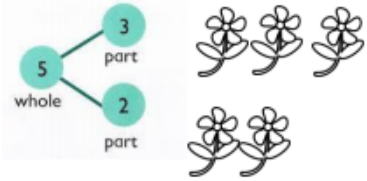
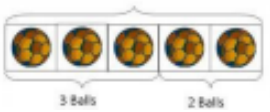
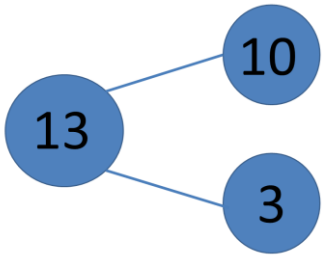
Contents

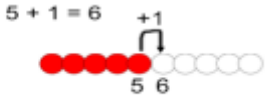
1. **Introduction**

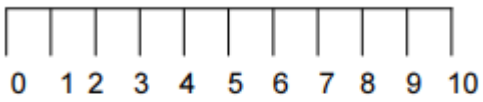
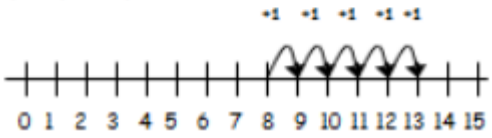
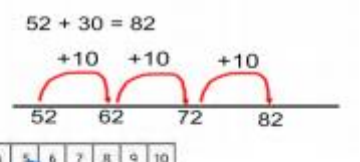
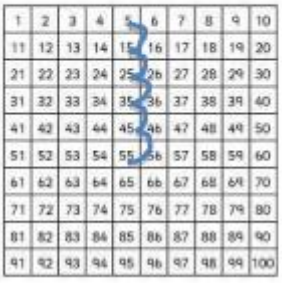
At South Stanley Infant and Nursery School we believe that children should be introduced to the processes of calculation through practical, written and mental activities. As children begin to understand the underlying ideas, they develop ways of recording to support their thinking and calculation methods, use particular methods that apply to different problems 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. A useful written method is one that helps children carry out a calculation and can be understood by others. It is important children acquire secure mental methods of calculation and efficient written methods 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 rather than specifying which method should be taught in a particular year group. By the end of Year 2, children should be able to choose the most appropriate approach to solve a problem: making a choice between using jottings, an efficient written method or a mental method. At South Stanley Infant and Nursery School we have adopted a mastery approach to Maths. Teaching Maths for mastery involves employing approaches that help pupils to develop a deep and secure knowledge and understanding of mathematics at each stage of their learning, so that by the end of every school year or Key Stage, pupils will have acquired mastery of the mathematical facts and concepts they've been exposed to, equipping them to move on confidently and securely to more advanced material. We aim to engage all pupils of all abilities through a challenging Maths curriculum that involves real life problems which require children to use reasoning and problem solving skills.

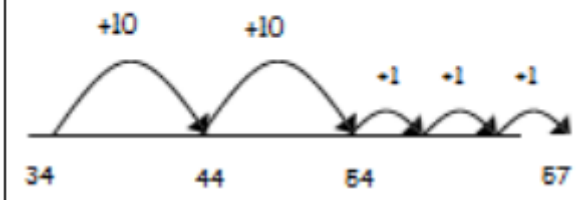
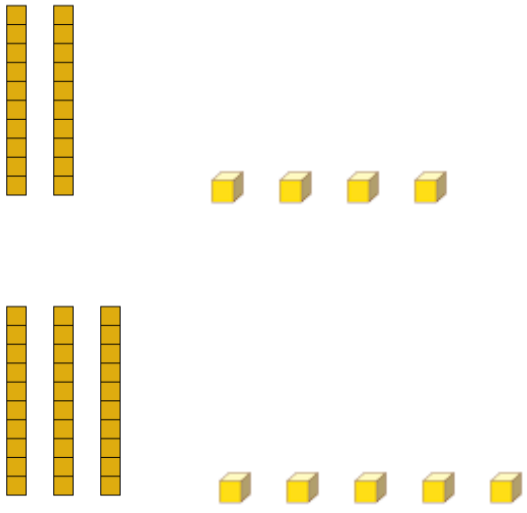
2. Addition

Step	Concept and Image	Comments
1. *Early Addition*	As a foundation: Focus on instant recognition of numbers to 5. Part whole model/Bar model  Then move onto: Partitioning numbers below 10 also using these methods. Combining groups of objects to find a total. 	Put all objects together and count. Find total of 2 groups using objects in hoops. Then total of 2 groups using objects and numerals in hoops. Then total of 2 groups using objects and hoops and recording as a number sentence. Then without hoops, with objects and record as a number sentence.
2. Combining two parts to make a whole. Part/whole		Use cubes to add two numbers together as a group or in a bar.

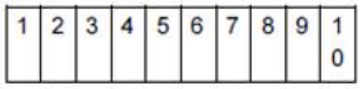
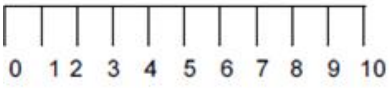
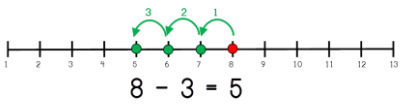
model, Bar model.	     	Use pictures to add two numbers together as a group or in a bar. Use the part whole model as shown to move into the abstract.
3. Number bonds up to 10.	How many ways of splitting up a number? 5 = 4 + 1 10 = 7 + 3 10 = ? + ? 9 = ? + ? 8 = ? + ? Etc Recognise that number sentences can be represented in different forms. 9 + 7 = 16 16 – 7 = 9 16 = 7 + 9	In order to calculate effectively children must know all the bonds for numbers up to ten. This will enable them to **jump** on the number line rather than count. Using a bead bar is also an effective way of showing how to split smaller numbers up.

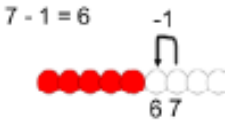
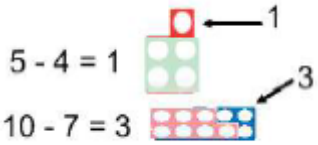
4. Locating numbers on a number line and adding one more.	Add one onto a number.  	Find 5 on number track, then add one. Encourage children to locate the first number and count on from there, rather than starting at zero.
5. *Relating groups of objects to a number line*	Informal number line/number sentences.  As above alongside a calculation. Children should experience a range ofrepresentations of numberlines, such as the progression listed below: Number track 1 2 3 4 5 6 7 8 9 10	Look at number sentences. Use objects on sheets to find answer. Then look at number sentences – use objects provided to find the answer. Look at number sentences, what do we have to do? Use objects to find an answer.

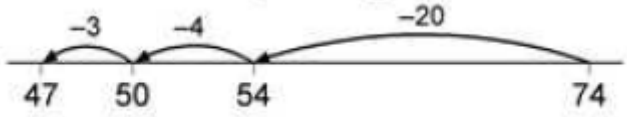
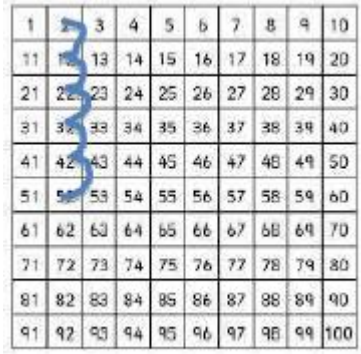
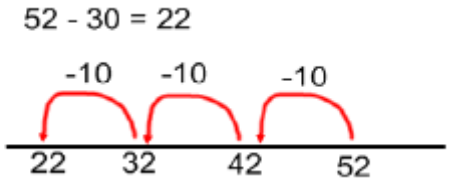
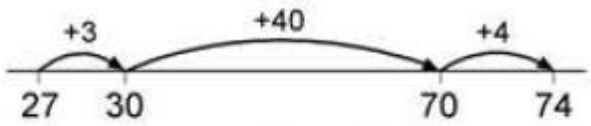
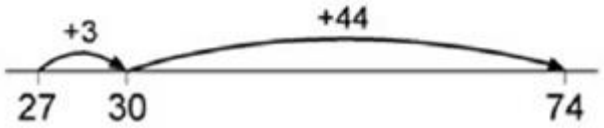
	• Number line, all numbers labelled  • Number line, 5s and 10s labelled • Number line, 10s labelled • Number lines, marked but unlabelled 8 + 5 = 13  	
6. Using number bonds to add on the number line.	Bridge 10 (eg: 8 + 7 = 15) 7 is partitioned into 2 and 5 creating a number bond to 10 with the 8 and then 5 is added to the 10. Show this with tens frames to begin with, then move onto number lines.  	Emphasise JUMP on number line, NOT counting! Use number bonds to jump to the next 10 on the number line. Then add what is left in one jump.
7. Using number line or hundreds square to jump in 10's from any 2 digit number.	Adding multiples of 10.  	Starting from any 2-digit number children must be able to jump in steps of ten. Focus on what happens to the tens and ones as you count. Focus on tricky parts: counting over 100, counting back past 20 in the teen numbers.

8. Adding on the number line or hundred square.	TU + TU 34 + 23 = 57  	This puts together the two previous ways of adding on a number line. THE NUMBER LINE REPRESENTS THE JUMPS IN YOUR HEAD. If adding near multiples of ten, more confident pupils can do adding a ten and adjusting: 43 + 19 = 43 + 20 = 63 – 1 = 62
9. Column addition (without bridging 10)	TO+ TO 24 + 35 **T O** **2 4 +** **3 5** **——** **T O** 	Chn should be encouraged to add the ones together and then the tens. This should be done using base 10 equipment until children are secure.

3. Subtraction

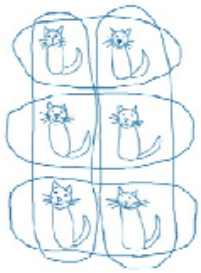
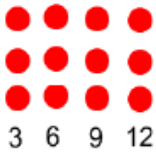
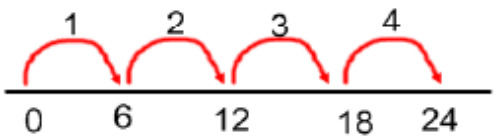
Step	Concept and Image	Comments
1. Early subtraction	Take away a number of objects from the group, count what's left.  Apply bar model.	Then start with a group of objects and record the numeral. Take some away, record and count what's left. Eg 6 take away 3 is 3.
2. Relating groups of objects to number lines.	Introduce - and = Symbols include Vocabulary: 'difference', show using equipment eg a line of 5 cubes and a line of 3 cubes, look at difference between the two sets. When chn are secure, move onto number line.  Children should experience a range ofrepresentations of numberlines, such as the progression listed below: Number track  • Number line, all numbers labelled  • Number line, 5s and 10s labelled • Number line, 10s labelled • Number lines, marked but unlabelled  	Emphasise JUMPING on a number line, not counting.

3. Locating numbers on a number line and finding one less.	Take away one from a number (counting back) 	Find number on a number track then SUBTRACT on. Encourage children to find the first number and count back from there, rather than starting at zero.
4. Number bonds up to ten.	Inverse use of number bonds (the opposite of step 3 for addition)  Also show using bar model.	Model with Numicon. In order to calculate effectively children must know all bonds for numbers up to 10. This will enable them to jump back on the number line rather than count.
5. Using number bonds to jump back on a number line	Jumping back (bridging ten) 15 – 7 = 8 – The 7 is partitioned into 5 and 2 to enable them to jump back to 10. Use tens frame to demonstrate this. Move onto number line when children are ready.  74 – 27 = 47 - worked out by counting back.	Emphasise JUMP on number line not count. Use number bonds to jump back to the previous 10 on the number line. Then subtract what is left in one jump. Use number bonds.

		
6. Using number line or hundred square to jump back from any number in steps of ten.	Jumping back in tens using hundred square.  Jumping back in tens using number line. 	Starting from any 2 digit number children must be able to jump back in steps of ten. Focus on what happens to the tens and ones as you count.
7. Subtracting on the number line by counting up (finding the difference)	74 – 27 =  The 'jumps' should be added, either mentally or with jottings according to confidence, beginning with the largest number e.g. 40 + 4 + 3. or 	The children should consider Is it a good idea to take away OR Is it a good idea to find the difference. If subtracting near multiples of ten, more confident pupils can do subtracting and adjusting: 43 – 19 = 43 - 20 = 23 + 1 = 24

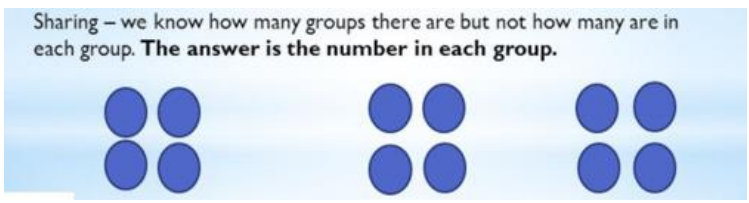
8. Column Subtraction (not bridging 10)	Easy column subtraction to practise layout. 73 - 41 32 Then 567 - 342 225	As with column addition, children should be encouraged to subtract the ones to begin with, then the tens.

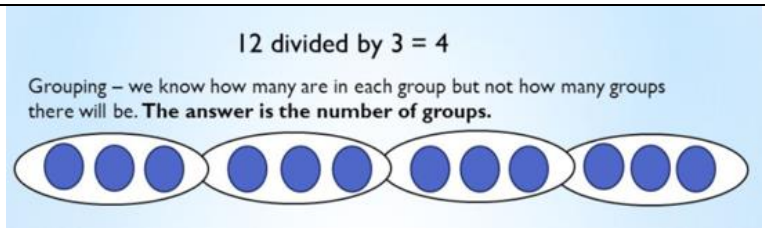
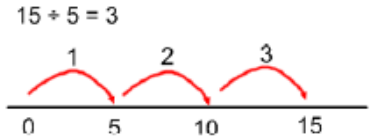
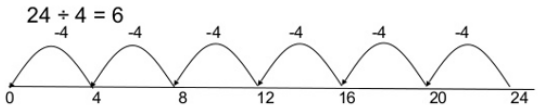
4. Multiplication

STEP	Concepts and Images	Comments
1. Simple multiplication	Array 3 groups of 2 And 2 groups of 3  3 x 4 = 12  4 x 3 = 12  Number line 6 x 4 = 24  	Read out the calculations as: 3x4 '3, multiplied 4 times' Emphasise that this is a group of 3, 4 times. Use an array to model the concept. Emphasise that children don't count individual dots, but count up in the appropriate steps. This can lead on to children representing their counting on a number line.

2. Repeated addition	5 x 3 = 15 is the same as 5 + 5 + 5 = 15  2 + 2 + 2 + 2 + 2 = 10	The main concept to get across is that when you multiply you are repeatedly adding the same number again and again. Counters can be used to illustrate this clearly.
3. Doubling	8 x 2 = 16 *(double the units)* 24 x 2 = 48 *(double the tens, double the units, combine)* 8 x 4 = 32 *(can use double, then double again)*	It is important that doubling and halving are taught independently to other mental strategies for multiplying and dividing. Children should be able to double, even large numbers by partitioning mentally.

5. Division

1. Sharing	12 divided by 3 = 4  	When sharing, you know how many groups you will have, you are working out how many will be in each group.

2. Grouping	 Apply to bar model.	When grouping, you know how many will be in each group, you are working out how many groups there will be.
3. Grouping on a number line	Grouping using number line 15 ÷ 5 = 3 	Children can use their times table knowledge to jump up the number line in groups of the appropriate amount.
4. Division using repeated subtraction.	24 ÷ 4 = 6 	As above, but children will start at the right of the number line, with the number they are dividing. Children will then jump back on the number line until they get to zero.