SPRATTON HALL

Maths Calculation Policy

September 2021

MATHS CALCULATION POLICY

Title: Maths Calculation Policy	Responsible: DAB
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	Next Review: September 2022

Introduction

The purpose of this booklet is to outline the various calculation strategies and methods that children are taught as they progress through the school, many of which look different to the methods that you may have been taught in your school days.
As children progress through the school, they are building a toolkit of strategies that can be applied when appropriate. We hope the explanations and examples of strategies will help you to assist your child at home.

The Fundamentals of Maths

It is extremely important that children are secure with the basic number facts from a young age, and that their speed of recall is worked on regularly as they move through the school. These facts include:

- Number bonds to 10, 20 and 100 (both adding and subtracting numbers together)
- Doubling of single digits, 20, 50, 100.
- Halving of even numbers under 50, and even multiples of 10 (60, 70 etc)
- Times tables up to including 12 x 12 (and related division facts)

A lot of emphasis in Maths teaching is placed on using mental maths. Carrying out mental calculations where possible is fundamental for a child's development and understanding. As pupils progress through the school, they are taught more formal written methods to use when they cannot complete the calculation in their heads.

Discussing the efficiency and suitability of different strategies is an important part of Maths lessons. Explaining strategies and processes orally helps to develop the use of appropriate mathematical vocabulary. Children will rarely be asked for just an answer, but instead asked to explain the strategy they used to get there.

When faced with a calculation problem, encourage your child to ask:

- Can I do this in my head?
- Could I do it using some drawings or jottings to help me?
- Do I need to use a written method?

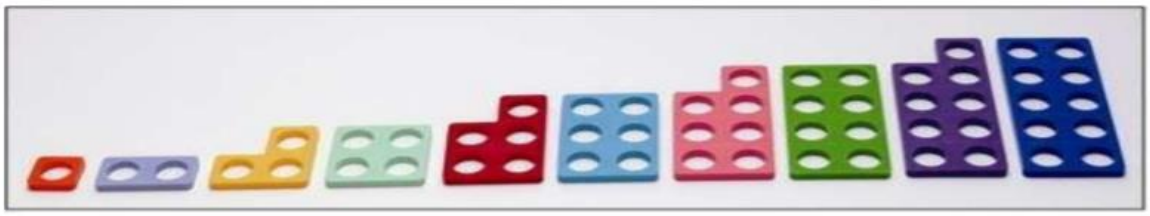
Also, help your child to estimate and check the answer. Encourage them to ask:

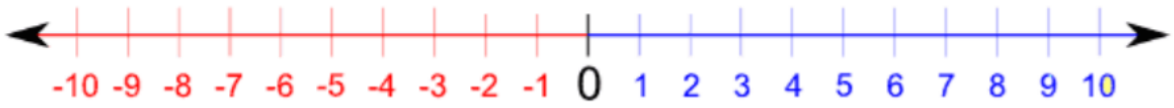
- Is the answer sensible
- Is there another way I can reach the answer?

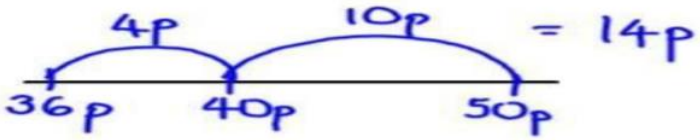
The Use of Number Lines

Number lines are a very important tool and are used in many calculations. Children are introduced to them from a young age and they will continue to be used and referred to as they progress through the school.

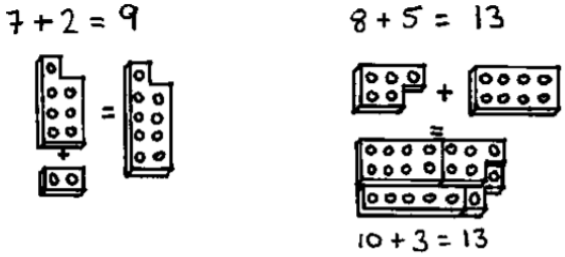
Number lines can take many forms and are used in a variety of ways to help develop children's understanding of number. Children become proficient in making 'jumps' up and down a number line to help them solve a mathematical problem.

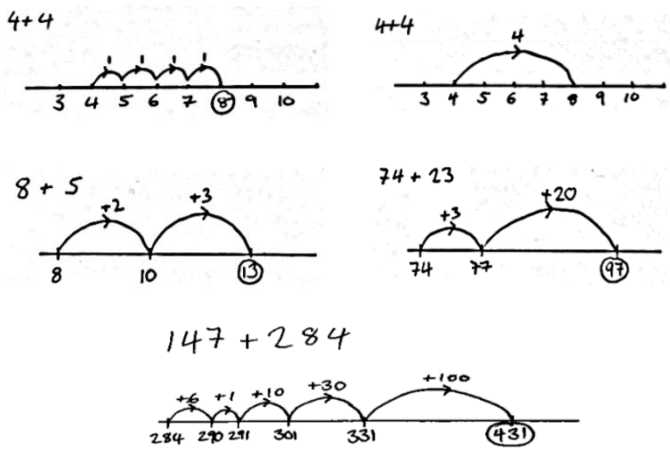
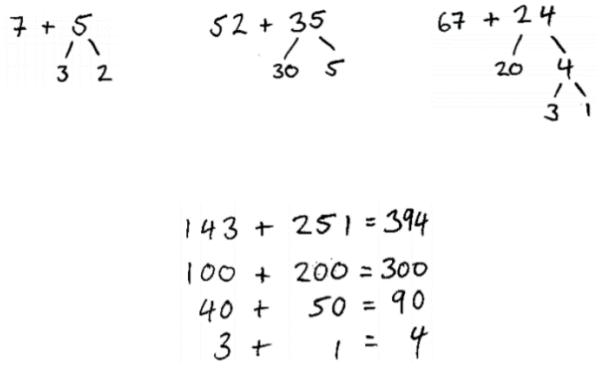
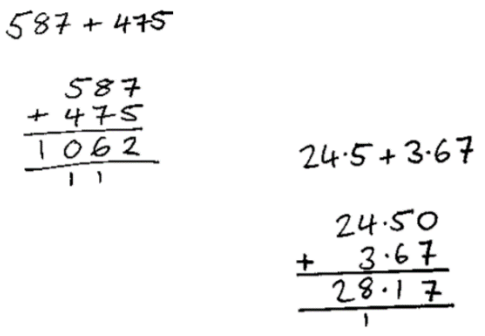




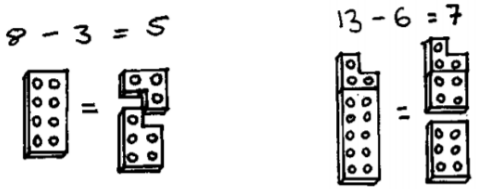


Addition

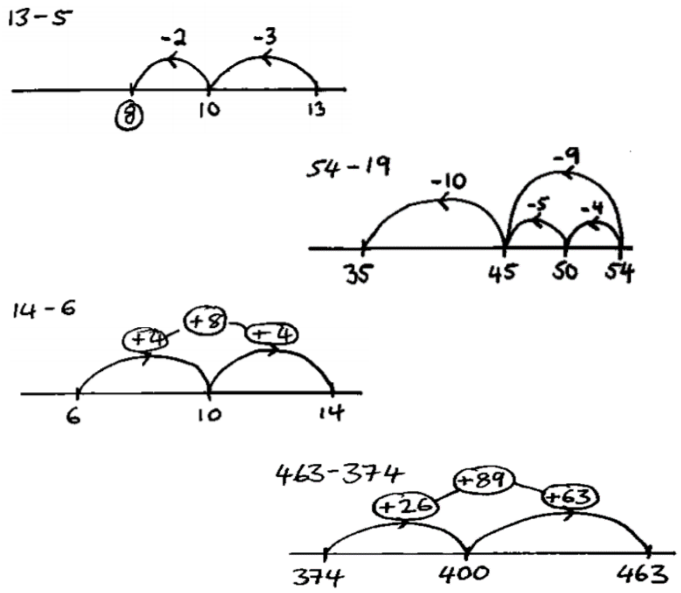
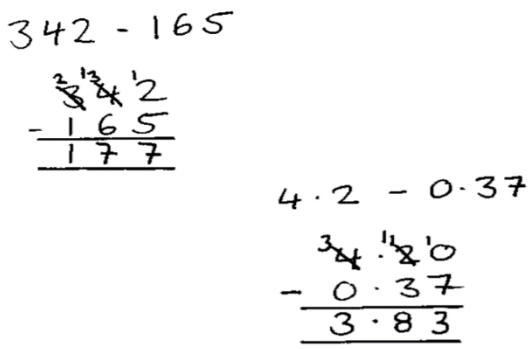
Numicon 	Children will use Numicon to add. This is where all children are taught to start with their addition. The use of physical equipment helps children to understand what is happening to numbers when they add them.
Number lines	Number lines are used from an

	early age, but will be used throughout the school. In KS1 they will be used as more informal written methods. In KS2, children will be taught that number lines are the written representation of what they should be doing mentally.
Partitioning 	By partitioning (splitting) numbers into different parts, they can be added separately and then combined to give the answer. Numbers can be partitioned to help with jumping to the next boundary and beyond. They can also be partitioned into place value parts to aid the addition of larger numbers.
Column addition (written method) 	In a column method, the numbers are placed into columns, ensuring units line up with units, tens with tens etc and adding starts with the furthest column to the right. If adding up to more than nine, the tens are carried over to the next column and are included when the next column is added up.

Subtraction

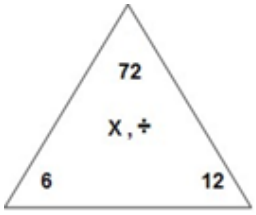
Numicon 	The use of physical equipment aids both the visual and kinaesthetic learners, as they can clearly see and touch the objects. Numicon works well as securing number facts.

Number lines in subtraction can be used for both counting back and for counting on. Counting back links the more familiar idea of taking away. This method is generally used when taking away a small number or a relatively large number. Counting on uses the idea that addition is the inverse of subtraction. This is generally used when the numbers are quite close together.

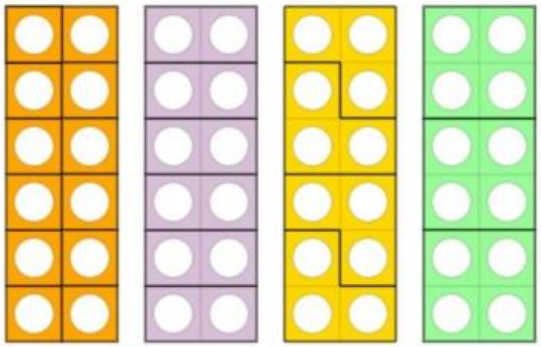
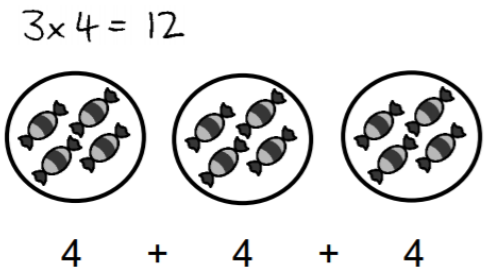
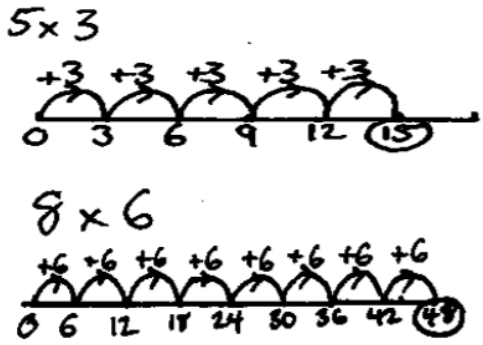
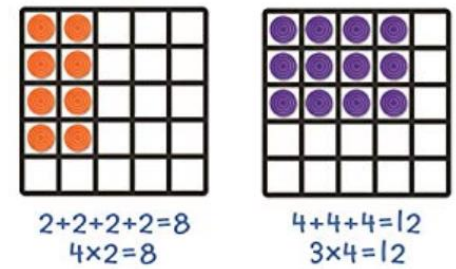
Number lines 	Note that how, as with addition, jumps to boundaries (10's and 100's) are key in the use of number lines, which reinforces the need for children to secure number bonds as early as possible. Number lines for counting on work well when finding the difference and when a boundary can be used that is between the two numbers. Jumping to a boundary requires number bond facts, but jumping on is always much easier.
Column subtraction (written method) 	In a column subtraction, the numbers are placed in columns, ensuring units line up with units, tens with tens etc and taking away starts with the column furthest to the right. When the top number is smaller than the bottom number, one is taken from the next column to make a two digit number in the original column.

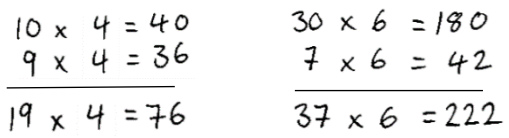
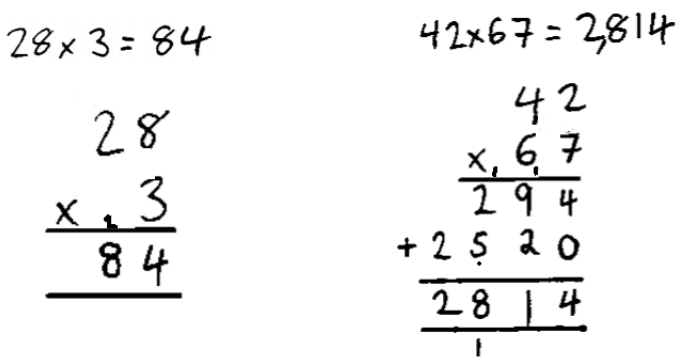
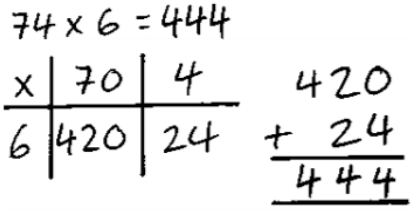
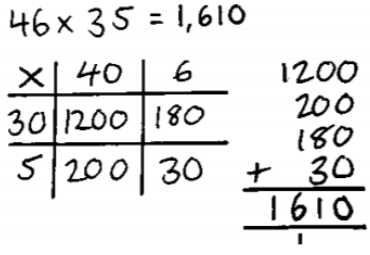
Multiplication

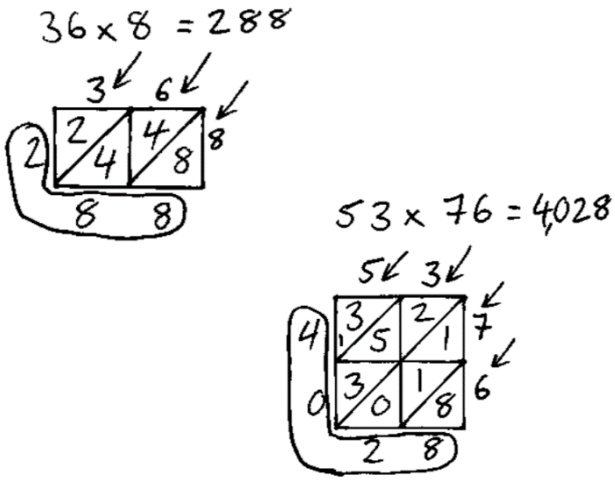
It cannot be stressed enough the importance of times tables in Maths. Not only do multiplication strategies demand a secure and quick recall, but they are also key for division and many other topics the children will study as they move through the school.
Times tables up to 12 x 12 should eventually be known off by heart.
With the use of Times Tables Rockstars, the children should build up their knowledge as they go through the school. A little and often approach is the best way to learn these facts!
The pupils are also taught to recognise the commutative effect of multiplication, so that they know that 6 x 3 is the same as 3 x 6. They are also taught the inverse relationship with division, so not only will they learn that 6 x 3 and 3 x 6 are 18,



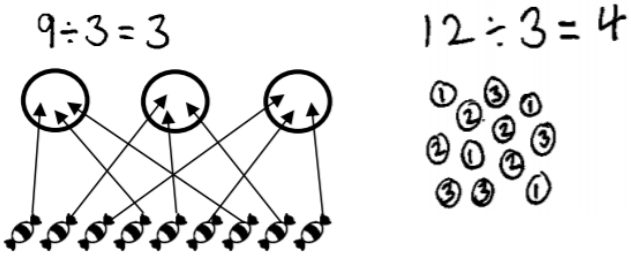
but also that 18 ÷ 6 = 3 and 18 ÷ 3 = 6. This relationship can be represented using a 'fact triangle'.

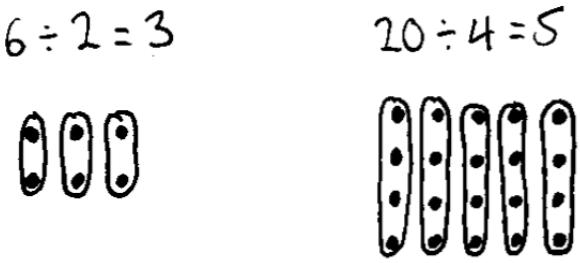
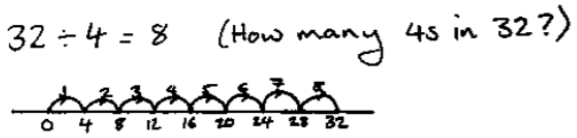
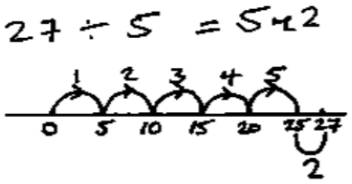
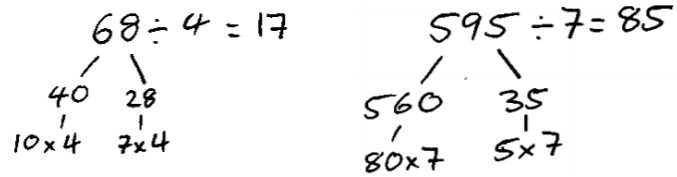
Numicon  1 x 12 2 x 6 3 x 4 4 x 3	Using Numicon allows children to link multiplication to repeated addition. The Numicon pieces can be laid out and counted, then placed together to help find the answer to multiplication facts. By finding different ways to make 12 using only one type of Numicon piece, the pupils can also find factors of a number.
Repeated addition  	Repeated groups of physical objects clearly show repeated addition and allow the multiplication to be found. Children can move on to draw dots of tally marks in groups.
Number lines (skip counting)  	Building on the idea of repeated addition, skip counting along a number line is a great multiplication strategy. This strategy leads easily onto counting mentally to find an answer.
Arrays  	Drawing an array gives children an image of the answer. It also helps the understanding that the numbers can be switched

	in multiplication so that 4 x 2 is the same as 2 x 4.
Partitioning  	When multiplication moves beyond the times tables, partitioning is a strategy the children will be taught to use if not using a written method.
Formal written methods At Spratton Hall, 3 different written methods may be taught. Each method has different strengths and weaknesses and ultimately the children, who are beginning to define themselves as mathematicians, will decide which method is the best to suit their needs and skills.	
Column method  	The column method is a more traditional method for completing a short or long multiplication calculation and is often enjoyed by those that have a more natural sense of Maths. When multiplying a 2 digit by 2 digit, pupils must remember to include the 0 at the second line of working to make their answer 10 x larger. This is to represent that they are actually multiplying by 60, not just 6.
Grid method   	The grid is formed by the same number of lines down and across as digits in the question. The individual squares are calculated using times table facts and taking into account the number of zeros in each part of the question. The answer is found by adding together all of the products. This method is visually easily to understand, but can be time consuming when multiplying large numbers.

Lattice method 	The lattice is usually very popular among the children, as it gives the answer with relatively little input. However, it is difficult to see how the maths works within this method and therefore does less to help with understanding. The lattice is set up with the same number of squares as the digits in the question. The answer is found by adding diagonally starting from the right.

Division

Numicon 	Numicon links very well to repeated subtraction. Numicon pieces of the size of the divisor can be laid out on top of the piece or pieces representing the dividend.
Sharing 	Sharing is the 'one for me, one for you' strategy of sharing things equally. Starting with physical objects, children then move on to their own informal drawings.

Grouping (repeated subtraction) 	Grouping is the strategy where the divisor is taken away a group at a time. Objects will once again be used before moving on to drawings and jottings.
Arrays 	Arrays clearly show division as a concept and allow the grouping strategy to flourish. The obvious closeness to the use of arrays in multiplication very much helps to develop the understanding that multiplication and division are inverses.
Number lines (skip counting)  With remainders 	Knowing that division is the inverse of multiplication, children can skip count the necessary times tables until they reach the multiple needed. Remainders are found by counting on from the multiple before, to the dividend. Skip counting is taught as a mental strategy, counting up the multiples on fingers in required.
Mental chunking 	When dealing with division of large numbers, the children will be encouraged to use chunking as a mental strategy. Using chunks of what they already know (10 lots, 100 lots

	etc) they can gather together various chunks to make the total.
Short division (bus stop method) Divisors can only be 1-digit $846 \div 3 = 282$ $423 \div 9 = 47$ $3\overline{)846}$ $9\overline{)423}$	Short division involves taking one column at a time, starting on the left and dividing it by a single-digit divisor. The answer goes on top and any remainders are carried to the next column.
Chunking $432 \div 16 = 27$ $16\overline{)432}$ -320 (20×16) 112 + -64 (4×16) 48 + -32 (2×16) 16 + -16 (1×16) 0 What I know $1 \times 16 = 16$ $2 \times 16 = 32$ $4 \times 16 = 64$ $8 \times 16 = 128$ $10 \times 16 = 160$ $20 \times 16 = 320$	When the divisor is a two digit number, we can use chunking. Taking forward the idea behind the mental chunking strategy, this method subtracts chunks in a more structured and formal way. The 'what I know' column can be really important as it gives the pupils a ready made list of chunks to take away.