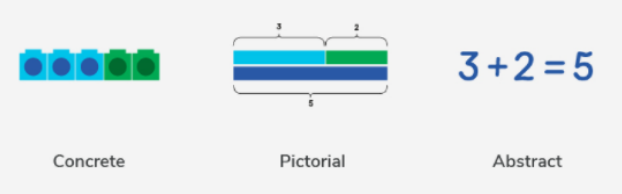
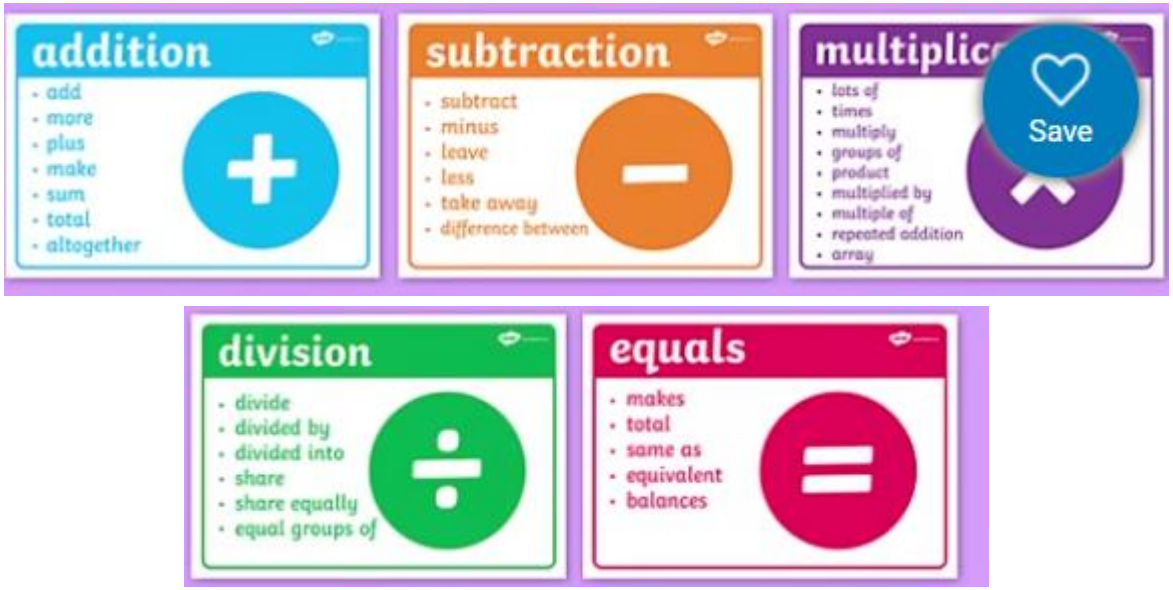
Tibshelf Infant and Nursery School Calculation Policy



This policy should make our school community aware of the progression and development of calculation strategies used in the teaching of mathematics. Children need not just to be able to calculate but to understand what is happening to the numbers and why.

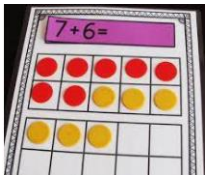
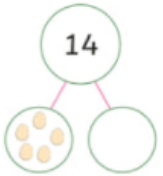
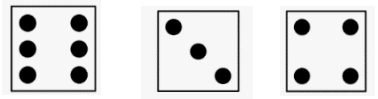
Mathematical Calculation Language

Picture of… language displayed on e.g. (twinkl)



In order not to confuse children it is important to use the correct mathematical vocabulary. There are many ways of saying the same thing as illustrated above. We don't use the language 'sum' rather we say 'number sentence'.

The National Curriculum 2014		
Aims- The national curriculum for mathematics aims to ensure that all pupils: • Become fluent in the fundamentals of mathematics including through varied and frequent practise with increasingly complex over time. So that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. • Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations and developing an argument, justification or proof using mathematical language • Can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasingly sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.		
Addition and Subtraction in the EYFS and National Curriculum		
Foundation Stage	**Year 1**	**Year 2**
Development Matters Guidance (non-statutory) **3-4 year olds will be learning to:** Solve real world mathematical problems with numbers up to 5. **Children in Reception (FS2) will be learning to:** compare numbers using vocabulary including; 'more than,' 'less than,' 'fewer,' 'the same as,' 'equal to.' Children will understand the 'one more than, one less than' relationship between consecutive numbers. Children will explore the composition of numbers to 10. **Early Learning Goal** Children at the expected level of development will: Have a deep understanding of number to 10, including the composition of each number. Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.	Statutory requirements Pupils should be taught to: read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs. Represent and use number bonds and related subtraction facts within 20. Add and subtract one-digit and two-digit numbers to 20, including zero. Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = – 9.	Statutory requirements Pupils should be taught to: solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures, applying their increasing knowledge of mental and written methods. Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100. Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones, a two-digit number and tens, two two-digit numbers, adding three one-digit numbers Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot. Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Addition		
Foundation Stage	Year 1	Year 2
<u>Working with 5 and then 10</u> Children engage with a variety of songs, rhymes, games and activities. They explore maths through real life experiences and problems. Children use concrete objects including 5/10 frames, the part, part whole model, counters, cubes and egg boxes. They are encouraged to develop mental pictures and images to help them understand the number system. Children count forward from a range of starting points in steps of 1's to 5/10/20 and beyond. Visual aids such as number tracks or number lines support them. How many more cups do we need? How many more counters do I need to make 5? Who as the same amount as me?	<u>Working with 10 then 20</u> Children count forward from a range of starting points in steps of 1's to 20/50/100. Visual aids such as number lines, number squares, bead strings support them. Adding by counting on. First by finding 1 more, then in steps of 1. 5 and 1 more is? 5 and 2 more is? 5 and 3 more is? 5 and 4 more is? Children can count on from the first number using objects, fingers, themselves etc. Teachers model drawing jumps on a number line to support understanding.	<u>Working with 20 and then 100</u> Children count back in tens and ones. Visual aids such as number lines, number squares and counting beads can support them. Children add numbers using, objects, pictorial representations, and mental methods.   Children add a two-digit number and ones, a two-digit number and tens and two two-digit numbers. 22 + 3 = 22 plus 10 is equal to 22 add 32 = Children begin to add 3 single digit numbers, by looking for pairs of numbers or doubles to aid mental calculation. 

Children explore the composition of numbers in depth.

Show me 5 using your fingers, can you show me a different way of representing 5?

You have 3 red apples and 2 green apples. How many apples do you have altogether?

Children compare quantities in depth. They look at 'collections' of quantities including some that are the same and discuss how much physical space they take up. Adults model language that children are encouraged to use such as; 'more than,' less than,' 'fewer,' 'the same as,' 'equal to.'

Children understand the 'one more than,' 'one less than' relationship between consecutive numbers. They recognise patterns of the counting system, e.g. what happens when you add one more.

Teddy has got 3 cakes on his plate, what will happen if he gets one more cake, how many cakes will he have altogether?

Through practical activities and discussion children use the vocabulary associated with addition. They talk about their learning using sentence stems, e.g. 3 red apples add 2 green apples are equal to 5

Children learn that addition can be done in any order but it is more efficient to put the greater number first.

Children need to understand the concept of equality before using the = sign. Calculation should be written either side of the equality sign so that the sign is not just interpreted as the 'answer,' e.g. 2= 1+1 and 2+3 = 4+ 1

Teachers should demonstrate jottings of calculations, to support children's understanding, Including pictorial representation as well as digits, e.g.

Children record addition sentences using + - and =.

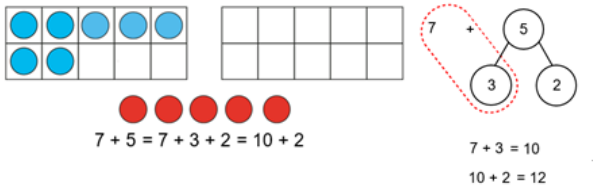
Missing numbers should be placed in all possible places within the number sentence.

Children use addition in terms of 'how many more' to calculate the difference.

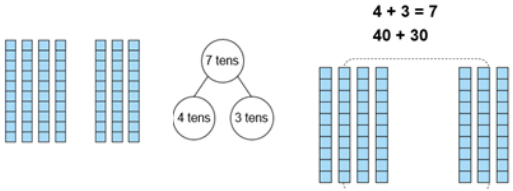
Children use their knowledge of number bonds to 10 to help them learn number bonds to 20.

Steps in addition often bridge through 10 and can be recorded on a number line.

Pictorial representatives such as the part, part whole model, or pictorial representations of base 10 can support children's calculations.



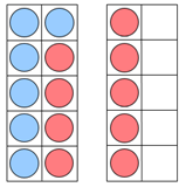
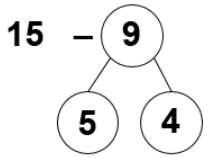
Children use their knowledge of number bonds to 10 and 20 to help them derive and use related facts to 100.

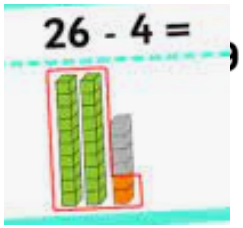


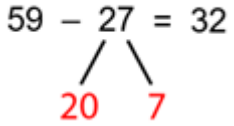
Children learn that while addition of 2 numbers can be done in any order (commutative), subtraction of one number from another cannot.

18+2=20 √	20-18=2 √
2+18=20 √	20-2=18 √
20=18+2 √	2-18=20 ×
20=2+18 √	18-2=20 ×

apples. Teachers demonstrate the use of a number track or number line. 1 more than 4 is 5. Children explore double facts. Double 4 is 8		Children recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Subtraction		
Foundation Stage	Year 1	Year 2
<u>Working with 5 and then 10</u> Children engage with a variety of songs, rhymes, games and activities. They explore maths through real life experiences and problems. Children use concrete objects including 5/10 frames, the part, part whole model, counters, cubes and egg boxes. They are encouraged to develop mental pictures and images to help them understand the number system. Sing subtraction songs such as 'Alice the camel,' '5 little speckled frogs.' Can you show me 5 little specked frogs using your fingers, now take one away, how many frogs are left? What is happening to the total of frogs, is it staying the same? How is it changing? Children count back in steps of 1's from 5/10/20 and beyond. Visual aids such as number tracks or number lines support them. Children compare quantities in depth. They look at 'collections' of quantities including some that are the same and discuss how much physical space they take up. Adults model language that children	<u>Working with 10 then 20</u> Children count back from different starting points in steps of 1's. Visual aids such as number lines, number squares, bead strings support them. Subtracting by counting back. First by finding 1 less, then in steps of 1. 1 less than 8 is? 2 less than 8 is? 3 less than 8 is? Children can count back from the first number using objects, fingers, themselves etc. Teachers model drawing jumps on a number line to support understanding. Teachers should demonstrate jottings of calculations to support children's understanding including pictorial representation as well as digits, e.g. draw a set of objects and then cross some out.	<u>Working with 20 and then 100</u> Children count back in tens and ones. Visual aids such as number lines, number squares and counting beads can support them. Children subtract numbers using objects, pictorial representations, and mental methods.  15 – 9 = 6  Children subtract single digit numbers, a two-digit number and ones, a two-digit number and tens and two two-digit numbers. 9-4= 22 take away 2 equals 22 minus 10 is equal to 22-12= Pictorial representatives such as the part, part whole model, or pictorial representations of base 10 can support children's calculations.

are encouraged to use such as; 'more than,' less than,' 'fewer,' 'the same as,' 'equal to.'	Children record subtraction sentences using - and =.	
Children understand the 'one more than,' 'one less than' relationship between consecutive numbers. They recognise patterns of the counting system, e.g. what happens when you take one away so there is one less/ one fewer?	Missing numbers should be placed in all possible places within the number sentence.	
	Operations as well as numbers may be hidden within number sentences.	Children explore efficient ways of finding a difference, e.g. by counting on or back. They can be supported by number lines and visual aids such as bead strings.
What do you think will happen if one more Teddy rolls out of the bed? How many teddies will be left in the bed? How many will be left if another teddy rolls out? What will happen when there is only 1 teddy left in the bed?	Children can compare number sentences.	Children learn that while addition of 2 numbers can be done in any order (commutative), subtraction of one number from another cannot.
Through practical activities and discussion children use the vocabulary associated with subtraction. They talk about their learning using sentence stems, e.g. 5 apples takeaway 2 apples are equal to 3 apples. Teachers demonstrate the use of a number track or number line.	Children learn how to find the difference using subtraction.	18+2=20 ✓ 20-18=2 ✓ 2+18=20 ✓ 20-2=18 ✓ 20=18+2 ✓ 2-18=20 × 20=2+18 ✓ 18-2=20 ×
1 less than 9 is 10. 10 subtract 9 equals 1.	Children begin to subtract to solve simple word problems.	
	Children begin to recognise that subtraction is the inverse of addition, with number facts to 10/20.	Children know that subtraction is the inverse of addition and use known number facts to calculate mentally. As children progress, they use known mental facts to aid their written calculations.

		4 + 3 = 7 **7 – 3 = 4** 64 + 3 = 67 67 – 3 = 64 Larger 2 digit numbers can be subtracted by partitioning the second number only.  **Pupils cannot partition both 2 digit numbers when subtracting as this can lead to errors!** Children use mental and written methods of subtraction to solve word and other problems. As children progress they may move onto subtraction using the column method, including exchanging numbers.

The National Curriculum 2014		
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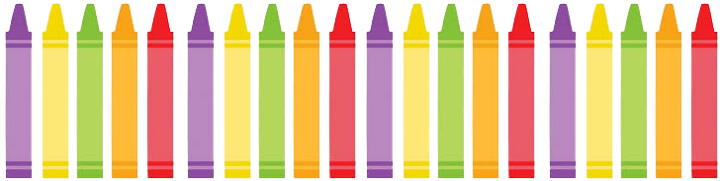
Division and Multiplication in the EYFS and National Curriculum		
Foundation Stage	**Year 1**	**Year 2**
Early Learning Goal Children at the expected level of development will: Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.	Statutory requirements Pupils should be taught to: solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	Statutory requirements Pupils should be taught to: Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers. Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs. Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Multiplication		
Foundation Stage	Year 1	Year 2
Children count groups and compare them, saying when they are the same. Children engage with a wide variety of songs, rhymes, games and activities. Links are made to real life problem solving activities.	Children group and count objects in multiples of 10's, 5's and 2's. Children explore double facts to 20 using equipment, e.g. cubes, counters. They begin to link this with multiplying by 2. Children multiply using concrete objects, pictorial representations and arrays with the support of the teacher.  4 lots of 2 is the same as 8  3 lots of 5 is equivalent to15 Children use the language associated with early multiplication, e.g. lots of, groups of. Children solve practical and word problems involving multiplication.	Children recall and use multiplication facts for the 2, 5 and 10 multiplication tables. Children continue to show multiplication using visual representations of an array. Children begin to record multiplication number sentences using x and =. Children use arrays and begin to recognise multiplication as repeated addition. Children use visual images as repeated addition. Children explore the fact that multiplication, like addition, can be done in any order. Children use these methods of multiplication to solve word and other problems.

Division		
Foundation Stage	Year 1	Year 2
Children count groups and compare them, saying when they are the same. Children engage with a wide variety of songs, rhymes, games and activities. Links are made to real life problem solving activities such as sharing objects into equal groups.	Children move from sharing to grouping in practical contexts.  There are 8 cakes. Share them equally between 2 people. Share 20 crayons between 2 pots How many will be in each pot?   Children explore the relationship between halving and doubling. They understand that it is the opposite or inverse.	Children continue to use the groupings of objects practically and relate to real life situations, including grouping numbers into equal sets with a remainder. Children continue to show division using visual representations of an array. Children begin to record division number sentences using and =. Children use arrays and begin to recognise division as repeated subtraction. 12 3 = 4 12-3 -3 -3 -3 =0 How many times did you subtract 3? 4 times.

	Half of 8 is 4 Double 4 is 8 8 shared between 2 is 4 2 lots of 4 is 8 Children use arrays to support their learning. Children begin to use practical grouping to solve word problems. "There are 12 cakes. Put 3 cakes on each plate. How many plates will you need?"	Children learn that division cannot be done in any order. Children use division methods to solve word and other problems.