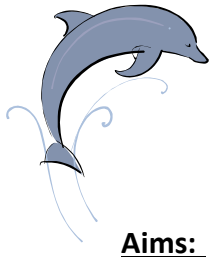
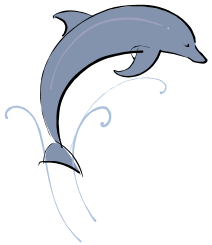
Brookburn Community Primary School





Aims: At Brookburn, we believe that a consistent and school wide approach to the teaching of calculations is key to ensure children experience smooth progression and continuity in their learning. This will provide children with the best opportunity to fully grasp concepts, apply their understanding and make progress in mathematics.

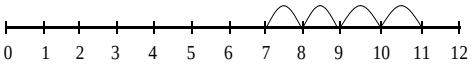
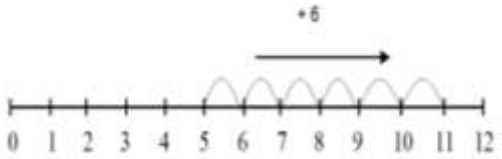
To ensure the purpose of calculation is understood, we believe that the use of real life contexts and problem solving approaches must be a priority. This will help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with unfamiliar problems.

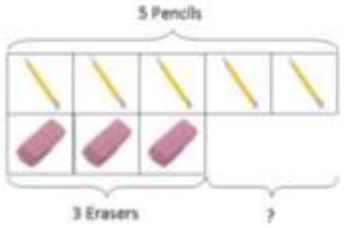
In Reception, early learning in number and calculations, follows the 'Development Matters' EYFS document, and this policy is designed to build on the content and methods established in the Early Years Foundation Stage.

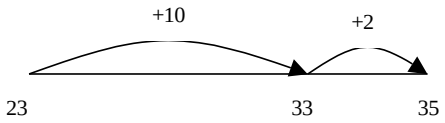
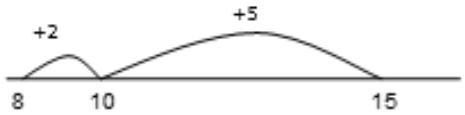
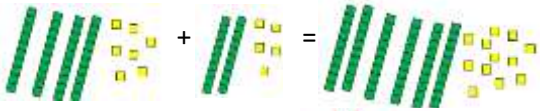
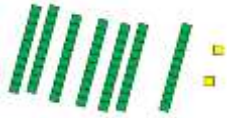
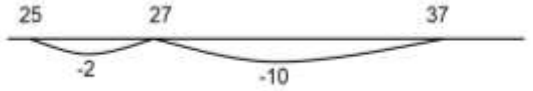
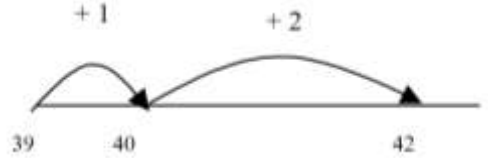
This policy reflects the requirements of the National Curriculum 2014, for the teaching and learning of mathematics

Addition and subtraction

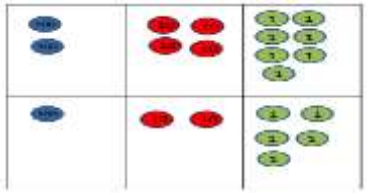
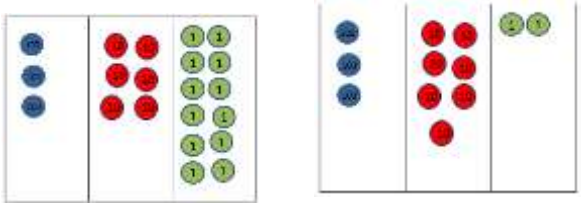
- Add and subtract numbers using concrete objects, pictorial representations.
- All number facts for all numbers 1-10 are secure by the end of Year 1 in order to progress and consolidate decimal numbers in KS2.
- From Year 2, inverse of addition and subtraction to be used to check both written and mental calculations.
- All methods must be supported using a range of counting resources such as numicon, cubes, dienes, coins, counters, bead strings, number tracks, number lines, number squares, cuisinaire, dice, place value counters, double sided counters
- Develop visualising an increasing amount of numbers

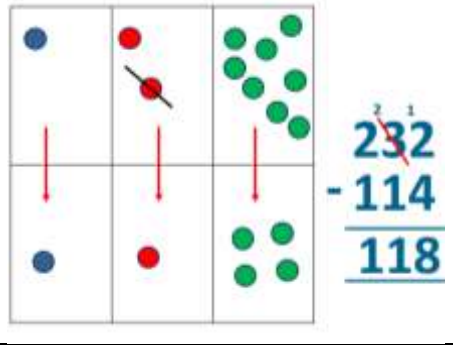
	Recall/mental	Mental strategies	Written	Examples	Problem solving
Year 1	To represent and use number bonds and related subtraction facts for all numbers 1-20. Add and subtract one-digit and two-digit numbers to 20, including zero.	– count on or back; – biggest number first; – begin to bridge; – use known number facts and place value to add or subtract pairs of single-digit numbers; – add 9 to single-digit numbers by adding 10 then subtracting 1; – identify near doubles, using doubles already known; – use patterns of similar calculations eg. 2 + 3 = 5 so 2 + 4 must be 6 (4 is one more than 3)	Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs Add and subtract numbers including: *a one digit number and ones * a two-digit number and ones *Written methods are informal at this stage – see mental methods for expectation of calculations)	+Counting all leading to <u>counting on</u>.  +<u>Counting on</u> using a number track  +<u>Counting on</u> using a number line 7+4  –<u>Taking away</u> as <u>counting back</u>   – <u>Taking away</u> as finding a <u>difference</u>  The bar model – concrete objects used which can be	Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ - 9; 20 - □ = 9; 15 – 9 = □; □ - □ = 11; 16 – 0 = □

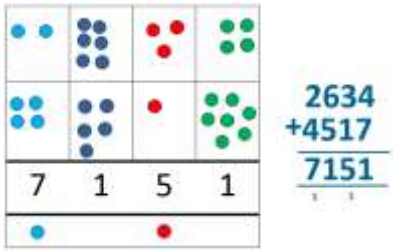
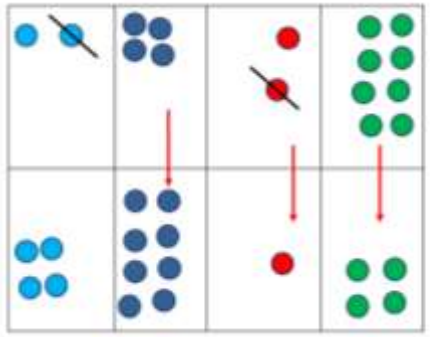
				moved, then cards with pictures before pictoral representations.  	

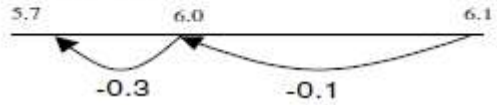
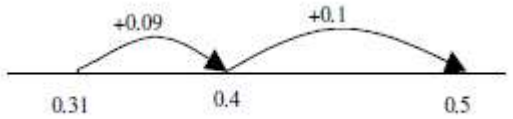
	Recall/mental	Mental strategies	Written	Examples	Problem solving
Year 2	Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100. Recall and use number bonds for multiples of 5 totalling 60 (to support telling time to nearest 5 minutes) Add and subtract numbers mentally, including: * a two-digit number and ones * a two-digit number and tens * two two-digit numbers * adding three one-digit numbers	-count on or back in tens or ones; – find a small difference by counting up from the smaller to the larger number; – biggest number first; – add three small numbers by putting the largest number first and/or find a pair totalling 10 or 20; – partition additions into tens and units then recombine; – bridge through 10 or 20; – use known number facts and place value to add or subtract pairs of numbers; – partition into '5 and a bit' when adding 6, 7, 8 or 9, then recombine; – add or subtract 9, 19, 11 or 21 by rounding and compensating; – identify near doubles; – use patterns of similar calculations; eg. 2 + 3 = 5 so 2 + 4 must be 6 (4 is one more than 3) – use the relationship between addition and subtraction.	Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs Add and subtract numbers including: * a two-digit number and ones * a two-digit number and tens *Written methods are informal at this stage	**+** Counting on in tens and ones  **+** Partitioning and bridging though 10  **+** Partitioning 47 25 60 + 12  Leading to exchanging  **+** **Expanded written method** 40 + 7 + 20 + 5 = 40+20 + 7 + 5 = 60 + 12 = 72 40 + 7 + 20 + 5 60 + 12 = 72 **–** Counting back to take away  **–** Counting on to take away.  Link to finding a difference. Continue to use the bar model.	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 Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change.

				Towards a written method for subtraction Use dienes to partition and take away, first without exchange, then with exchange.	

	Recall/mental	Mental strategies	Written	Examples	Problem solving
Year 3	Recall and use addition and subtraction facts for 100 (multiples of 5 and 10) Derive and use addition and subtraction facts for 100. Derive and use addition and subtraction facts for multiples of 100 totalling 1000. Add and subtract numbers mentally, including: * a three-digit number and ones * a three-digit number and tens * a three-digit number and hundreds Add and subtract fractions with the same denominator within 1 whole.	– count on or back in tens or ones; – find a small difference by counting up from the smaller to the larger number; – biggest number first; – add three or four small numbers by putting the largest number first and/or by finding pairs totalling 9, 10 or 11; – partition into tens and units then recombine; – bridge through a multiple of 10, then adjust; – use knowledge of number facts and place value to add or subtract pairs of numbers; – partition into '5 and a bit' when adding 6, 7, 8 or 9; – add or subtract mentally a 'near multiple of 10' to or from a three-digit number; – identify near doubles; – use patterns of similar calculations eg. 12 + 27 = 39 so 12 + 37 must be 49 (49 is ten more than 39); – say or write a subtraction statement corresponding to a given addition statement;	Add and subtract numbers with up to three digits, using informal methods, progressing to formal written methods of columnar addition and subtraction where appropriate.	**+ Partition into tens and ones** Partition both numbers and recombine. Count on by partitioning the second number only e.g. 247 + 125 = 247 + 100 + 20+ 5 = 347 + 20 + 5 = 367 + 5 = 372 **+ Towards a Written Method for addition** Introduce columnar addition modelled with place value counters (Dienes could be used for those who need a less abstract representation)  247 +125 12 60 300 372  + Leading to formal columnar addition 247 + 125 372 1 **– Towards a written method for subtraction**	Solve problems, including missing number problems (including some 2-step) using number facts, place value, and more complex addition and subtraction

				Use dienes then place value counters to show column subtraction, without exchange, then with exchange using 3 digit numbers. 	

	Recall/mental	Mental strategies	Written	Examples	Problem solving
Year 4	Select a mental strategy appropriate for the calculation. Add and subtract mentally combinations of two and three digit numbers and decimals to one decimal place. Recall and use addition and subtraction facts for 100. Recall and use addition and subtraction facts for multiples of 100 totalling 1000. Add and subtract fractions with the same denominator. **Derive** and use addition and subtraction facts for all numbers 1-10 (with decimal numbers to one decimal place)	Apply the same strategies as in year 3 but using decimals as well as whole numbers.	Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.	+Columnar addition of 4 digit numbers modelled with place value counters.  2634 +4517 7151 – Progress to subtraction of 4 digit numbers with decomposition, using place value counters.  6232 - 4814 1418	Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why. Solve addition and subtraction problems involving missing numbers.

	Recall/mental	Mental strategies	Written	Examples	Problem solving
Year 5	Select a mental strategy appropriate for the numbers. Add and subtract numbers mentally with increasingly large numbers and decimals to two decimal places. Add and subtract mentally with increasingly large numbers. **Derive** and use addition and subtraction facts for all numbers 1-10 (with decimal numbers to two decimal place) **Recall** and use addition and subtraction facts for all numbers 1-10 (with decimal numbers to one decimal place)	Consolidate previous strategies but using two decimal places as well as whole numbers.	Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) Move onto decimal numbers to 2 decimal places. Recognise mixed numbers and improper fractions and convert from one to the other.	135.62 + 54.69 190.31 1 1 1 Place value counters can be used alongside the columnar method to develop understanding of addition with decimal numbers. **Use known number facts and place value to subtract** 6.1 – 0.4 = 5.7  Find a difference by counting up e.g. 0.5 – 0.31 = 0.19 This can be modelled on an empty number line (see complementary addition below).  	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Solve addition and subtraction problems involving missing numbers.

	Recall/mental	Mental strategies	Written	Examples	Problem solving
Year 6	Select a mental strategy appropriate for the numbers. Add and subtract mentally combinations of two and three digit numbers and decimals to one decimal place. Perform mental calculations, including with mixed operations and large numbers. **Recall** and use addition and subtraction facts for all numbers 1-10 (with decimal numbers to two decimal place)	but using two decimal places as well as whole numbers.	Add and subtract whole numbers and decimals using formal written methods (columnar addition and subtraction) Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.	**<u>Written methods</u>** As year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency with columnar method to be secured. Continue calculating with decimals, including those with different numbers of decimal places	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Solve addition and subtraction problems involving missing numbers.