



Calculation Policy

Addition

<p>EYFS</p>	<p>Reception: ELG 2018 Numbers to 20: place them in order and say which number is one more or one less than a given number Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer They solve problems, including doubling, halving and sharing. Exceeding: Estimation and checking quantities by counting up to 20 Combining groups of 2, 5 or 10 or sharing into equal groups</p>	
<p>Year</p>	<p>1</p>	<p>2</p>
<p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p>Basic to subject specific (Beck's Tiers): +, add, more plus make, sum, total altogether score double, near double one more, two more... ten more how many more to make...? how many more is... than...? how much more is...?</p> <p>Instructional vocabulary: start from, start with, start at look at point, to show me</p>	<p>Basic to subject specific (Beck's Tiers): +, add, addition, more, plus make, sum, total altogether score double, near double one more, two more... ten more... one hundred more how many more to make...? how many more is... than...? how much more is...?</p> <p>Instructional vocabulary: tell me, describe, name, pick out, discuss, talk about, explain, explain your method, explain how you got your answer, give an example of... show how you...</p>
<p>NC 2014</p>	<p>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.</p>	<p>Recording addition in columns supports place value and prepares for formal written methods with larger numbers.</p>
	<p>Concrete, pictorial, abstract</p>	<p>Concrete, pictorial, abstract</p>



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<p>Developing Conceptual/ Procedural Understanding</p>	<p>Number bonds</p> <p>$10 = 5 + 5$ $10 = 7 + 3$</p> <p>We have 10 pegs on the coathangers, how can we split them into 2 groups? Is there another way? How can we be sure we have got them all?</p> <p>Numicon Ten Frame</p> <p>$2 + \square = 10$ $10 - \square = 3$ $5 + \square = 10$ $10 - \square = 9$ $\square + 4 = 10$ $10 - 0 = \square$</p> <p>Use the pattern to complete the number sentences.</p> <p>Use bonds of 10 to calculate bonds of 20.</p>	<p>$1 + 1 = 2$ $2 - 1 = 1$ double 1 is 2 half of 2 is 1</p> <p>$2 + 2 = 4$ $4 - 2 = 2$ double 2 is 4 half of 4 is 2</p> <p>Count all</p> <p>Count on</p> <p>Count on, on number track in 1s.</p> <p>Develop knowledge of fact families.</p> <p>$7 = 5 + 2$ $2 + 5 = 7$ $7 - 2 = 5$ $7 - 5 = 2$</p>	<p>Whole-part model</p> <p>20 ? ?</p> <p>Fill in the missing numbers</p> <p>Balance image for concept of equality.</p> <p>$1 + 8 = 9$</p>	<p>Multilink /unifix</p> <p>Picture</p> <p>27 15 ?</p> <p>100 23 77</p> <p>Whole-part model</p> <p>Fill in the missing numbers</p> <p>All answers to be recorded in a number sentence following any informal recording.</p> <p>Adding more than two numbers</p> <p>Strategy to include looking for facts or bonds that are useful e.g. bonds up to and including 10, doubles or adding 10 to a given number.</p> <p>$6 + 3 + 4 = 13$</p> <p>$6 + 3 + 4 + 7 + 2 = 22$</p> <p>Children to show notation.</p>	<p>Adjustment strategy</p> <p>$5 + 9 =$ $5 + 10 - 1 = 14$</p> <p>$5 + 10 - 1 = 14$</p> <p>$25 + 30 - 1 = 54$</p> <p>(Round and adjust) Doubles then near doubles</p> <p>$5 + 6 =$ $5 + 5 + 1 = 11$</p> <p>$7 + 8 =$ $8 + 8 - 1 = 15$</p> <p>$47 + 50 =$</p> <p>Re-arranging</p> <p>$18 + 4 =$</p> <p>Tell me what you know about 4, e.g. $3 + 1$, $2 + 2$</p> <p>$18 + 4 =$ Rearrange the 4 into $2 + 2$</p> <p>So $18 + 2 + 2 = 20 + 2 = 22$</p> <p>$59 + 24 =$ Partition the 24 into $20 + 4$ and rearrange the 4 into $1 + 3$.</p> <p>So $59 + 24 = 59 + 20 + 1 + 3$ $= 59 + 1 + 20 + 3$ $= 83$</p>	<p>Partition and recombine</p> <p>Record partitioned steps in number sentences then add mentally.</p> <p>$40 + 20 = 60$ $6 + 7 = 13$ $60 + 13 = 73$</p> <p>Moving on to: $46 + 27 = 60 + 13 = 73$</p> <p>Balance in the equation</p> <p>$14 = 8 + 6$, $7 + 6 = 8 + 5$ $\square = 13 + 9$ $3 + \square + 6 = 16$ $14 + \diamond = 15 + 27$</p> <p>Decision making</p> <p>Using statements such as: Ben did $14 + 9 = 23$ How could he have done it?</p>
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Calculation Policy

Known facts	Represent & use number bonds and related subtraction facts within 20 Add and subtract 1 digit and 2 digit numbers to 20, including zero		Recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100.	
Essential Knowledge	1 more	Number bonds: 5 and 6	10 more	Number bonds: 20, 12 and 13
	Largest number first.	Number bonds: 7 and 8	Add 1 digit to 2 digit by bridging	Number bonds: 14 and 15
	Add 10.	Number bonds: 9 and 10	Partition second number and add tens then ones.	Number bonds: 16 and 17
	Ten plus ones.	Use number bonds of 10 to derive bonds of 11	Add 10 and multiples of 10.	Number bonds: 18 and 19
	Doubles up to 10.		Doubles up to 20 and multiples of 5.	Partition and recombine.
			Add near multiples of 10.	



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<p>KS1</p> <p><i>Ones* reference the value is ones but the column is termed units</i></p>	<p>Pupils should practise addition to 20 and within to become increasingly fluent. They should use the facts they know to derive others, e.g using $7 + 3 = 10$ to find $17 + 3 = 20$, $70 + 30 = 100$</p> <p>They should use concrete objects and practical apparatus, such as bead strings and number lines to explore additions including missing numbers.</p> <p>Use pictorial representations such as bar models and whole part diagrams to show additive relationships.</p> <p>100 squares could be used to explore patterns in calculations such as $74 + 11$, $77 + 9$ encouraging children to think about 'What do you notice?' where partitioning or adjusting is used.</p> <p>Pupils should learn to check their calculations, by using the inverse.</p> <p>They should continue to see addition as both combining groups and counting on.</p> <p>They should use Dienes to model partitioning into tens and ones* and learn to rearrange numbers in different ways e.g. $23 = 20 + 3 = 10 + 13$.</p> <p>Show understanding that adding zero leaves a number unchanged.</p>	
<p>Year</p>	<p>3</p>	<p>4</p>
<p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary</p> <p>Appendix 1b: Vocabulary book</p>	<p>Basic to subject specific (Beck's Tiers): +, add, addition, more, plus make, sum, total altogether score double, near double one more, two more... ten more... one hundred more how many more to make...? how many more is... than...? how much more is...?</p> <p>Instructional vocabulary: explain your method explain how you got your answer give an example of... show how you... show your working</p>	<p>Basic to subject specific (Beck's Tiers): add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make...?</p> <p>Instructional vocabulary: calculate, work out, solve investigate, question answer check</p>
<p>NC 2014</p>	<p>Add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction.</p>	<p>Add and subtract numbers with up to 4 digits using the formal written method of columnar addition and subtraction where appropriate. Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.</p>



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Developing Conceptual/ Procedural Understanding	<p>Near doubles $13+14 =$ Double $13= 26$ $26+1 =27$ or Double $14 =28$ $28-1=27$</p> <p>Using known facts $40 + 80 = 120$ using $4 + 8 = 12$ So $400 + 800 = 1200$</p> <p>Remodelling strategy $243 + 198$ $241 + 200 = 441$</p> <p>Place value materials to represent calculations Diennes and then place value counters.</p>	<p>Start with least significant digit 67 $+ 24$ $11 (7+4)$ $+ 80 (60+20)$ 91</p> <p>“7 add 4 equals 11 and 60 add 20 equals 80. $1+ 0 = 1$ and 1 ten + 8 tens = 9 tens”</p> <p style="text-align: right;"> 625 $+ 48$ $13 (5+8)$ $60 (20 + 40)$ $+600 (600 + 0)$ 673 </p> <p>All language in the context of the place value and the mental addition of the totals to be done in any order.</p>	<p>Columnar addition 625 $+ 48$ 673 1</p> <p>Representing problems There are 334 children at Springfield School and 75 at Oak Nursery. How many children are there altogether?</p>	<p>Using known facts $40 + 80 = 120$ using $4 + 8 = 12$ So $400 + 800 = 1200$ and $4000+8000=12,000$</p> <p>Remodelling strategy $3548 + 1998$ $3546 + 2000 = 5546$</p>	<p>Columnar addition 587 $+ 475$ 1062 11</p> <p>“7 add 5 equals 12. That’s 2 units and 1 ten to carry over. 80 add 70 equals 150 and the 1 ten to carry makes 160. That’s 6 tens and 100 to carry over. 500 add 400 equals 900 and the 1 hundred to carry makes 1000”</p> <p style="text-align: right;"> 7648 $+1486$ $14 (8+6)$ $120 (40+80)$ $1000 (600+400)$ $+ 8000 (7000+1000)$ 9134 7648 $+ 1486$ 9134 111 </p>	<p>Columnar addition (decimals) in contexts such as money and measurement</p> <p style="text-align: right;"> 12.45 7.36 $+ 24.50$ 44.31 111 </p> <p>Representing problems There are 259 more boys than girls in Lucy’s school. If there are 789 girls, how many pupils are there altogether?</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 100px; text-align: center;">?</div> <div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 5px; margin: 10px auto; width: 200px;"> 759 759 + 259 </div>
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Known facts	Derive and use addition and subtraction facts to 100, e.g. $33+ 67 =100$.		Derive and use addition and subtraction facts (for multiples of 10) to 1000, e.g. $330+ 670=1000$.	
Essential knowledge	Add single digit bridging through boundaries	Add multiples of 10,100	Fluency of 2 digit + 2 digit	Add multiples of 10, 100 and 1000
	Partition second number to add	Pairs of 100 (complements of 100)	Partition second number to add	Decimal pairs of 10 and 1
	Use near doubles to add	Add near multiples of 10 and 100 by rounding and adjusting	Use near doubles to add	Adjust both numbers before adding
	Partition and recombine		Add near multiples	Partition and recombine

Year	5	6
Layers of vocabulary	<p>Basic to subject specific (Beck’s Tiers): add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make...?</p>	<p>Basic to subject specific (Beck’s Tiers): add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make...?</p>



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 <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p>Instructional vocabulary: put, place arrange, rearrange change, change over split, separate</p>		<p>Instructional vocabulary: put, place arrange, rearrange change, change over adjusting, adjust split, separate carry on, continue, repeat what comes next? predict describe the pattern, describe the rule find, find all, find different investigate</p>	
<p>NC 2014</p>	<p>Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction). Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</p>		<p>Solve problems involving addition, subtraction, multiplication and division.</p>	
<p>Developing Conceptual/ Procedural Understanding</p>	<p>Columnar addition Include calculations involving more than 2 numbers and carrying figures >1.</p> $\begin{array}{r} 25567 \\ 16397 \\ +15984 \\ \hline 57948 \\ 1\ 1\ 2\ 1 \end{array}$ <p>Include calculations with 'empty columns'. $124.9 + 7.25$</p> $\begin{array}{r} 124.90 \\ +\ 7.25 \\ \hline 132.25 \\ 1\ 1 \end{array}$	<p>Representing problems If 2541 is the answer, what's the question? - Can you create three addition calculations? - Can you create three subtraction calculations? - Did you use a strategy?</p>	<p>Columnar addition Include calculations with up to 3 'empty columns'. $128.7 + 3.014$</p> $\begin{array}{r} 128.700 \\ +3.014 \\ \hline 131.714 \\ 1 \end{array}$	<p>Representing problems 7208 females attended a concert as well as 8963 males. There were originally 20000 seats on sale. How many empty seats were there at the concert?</p>
<p>Known facts</p>	<p>Derive and use addition and subtraction facts to 10 and 1, e.g. $3.3 + 6.7 = 10$ and so $0.33 + 0.67 = 1$.</p>		<p>All the KS2 required facts</p>	
<p>Essential knowledge</p>	<p>Fluency of 2 digit + 2 digit including with decimals</p>	<p>Add multiples of 10, 100, 1000 and tenths</p>	<p>Fluency of 2 digit + 2 digit including with decimals</p>	<p>Add multiples of 10, 100, 1000, tenths and hundredths</p>
	<p>Partition second number to add</p>	<p>Use number facts, bridging and place value</p>	<p>Partition second number to add</p>	<p>Use number facts, bridging and place value</p>
	<p>Adjust numbers to add</p>	<p>Partition and recombine</p>	<p>Adjust numbers to add</p>	<p>Partition and recombine</p>



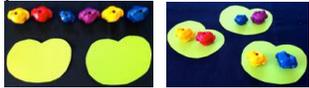
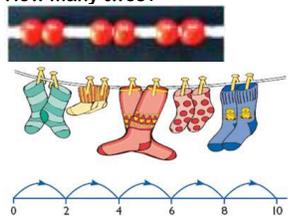
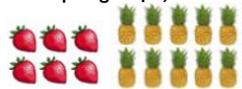
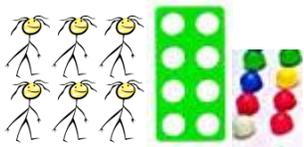
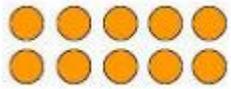
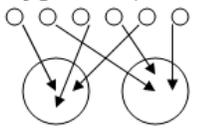
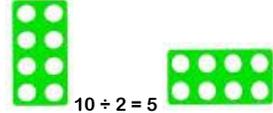
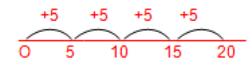
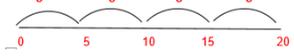
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Division

<p>EYFS</p>	<p>Reception: ELG 2018 Numbers to 20: place them in order and say which number is one more or one less than a given number Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer They solve problems, including doubling, halving and sharing.</p> <p>Exceeding: Estimation and checking quantities by counting up to 20 Combining groups of 2, 5 or 10 or sharing into equal groups</p>	
<p>Year</p>	<p>1</p>	<p>2</p>
<p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p>Basic to subject specific (Beck's Tiers): count in ones, twos... tens... share, groups of, equal groups odd, even</p> <p>Instructional vocabulary: count out, share out, left, left over</p>	<p>Basic to subject specific (Beck's Tiers): share, share equally one each, two each, three each... group in pairs, threes... tens equal groups of ÷, divide, divided by, divided into left, left over</p> <p>Instructional vocabulary: tell me, describe, name, pick out, discuss, talk about, explain, explain your method, explain how you got your answer, give an example of... show how you</p>
<p>NC 2014</p>	<p>solve one-step problems involving multiplication and</p>	<p>Calculate mathematical statements for multiplication and division within the multiplication tables</p>



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	division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	and write them using the multiplication (x), division (÷) and equals (=) signs.		
Developing Conceptual/ Procedural Understanding	<p>Grouping/Sharing models Using practical contexts and cross-curricular links (PE) such as socks and shoes; animals in the ark to get into groups. Sharing models such as sharing pieces of fruit.</p> <p>Sharing into equal groups 6 frogs shared equally between 2 lily pads gives 3 frogs on each lily pad or Grouping in equal groups 6 frogs grouped in 2s need 3 lily pads to sit on</p>  <p>GROUPING ITP How many twos?</p> 	<p>Arrays (rectangular arrangements to show equal groups)</p>    <p>Decision making How many cars can you make if you have 8 wheels?</p>  <p>How many different ways can you arrange 12 buttons in equal groups?</p> 	<p>Grouping/Sharing models Introduce the ÷ symbol</p>  <p>15 frogs shared equally between three lily pads $15 \div 3 = 5$ or 15 frogs grouped in 5s need 3 lily pads to sit on $15 \div 5 = 3$</p> <p>15 ÷ 3 = 5 groups of 3 (grouping)</p>  <p>$20 \div 2 = 10$</p>   <p>5 hops in 15. How big is each hop?</p> <p>There are 7 cakes and 2 children. How many cakes will they get each? (Leftovers/remainders introduced)</p>  <p>$7 \div 2 = 3r1$</p>	<p>Arrays</p>  <p>$10 \div 2 = 5$ and $10 \div 5 = 2$</p> <p>Repeated addition (to reach a given target)</p>  <p>There are 20 sweets in a bag. How many children can have 5 each?</p>  <p>Repeated subtraction (from a given quantity)</p>  <p>Links to tables</p>  <p>Use language of division linked to tables using counting stick</p> <p>Representing problems Jane has 30 cakes. She wants to share them equally between 5 boxes. How many cakes should go in each box?</p>  <p>$30 \div 5 = 6$ Number of cakes in each box = 6</p>
Known facts	Count in multiples of twos, fives and tens.		Recall and use x and ÷ facts for the 2, 5 and 10 x tables, including recognising odd and even numbers.	
Essential Knowledge	Count back in 2s	Halves up to 10	Division facts (2 x table)	Halves up to 20
	Count back in 10s	Halve multiples of 10	Division facts (10 x table)	Review division facts (2 x, 5 x, 10 x tables)



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	Count back in 5s	How many 2s? 5s? 10s?	Division facts (5 x table)	Count back in 3s
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KS1	<p>Noticing how counting in multiples of 2, 5 and 10 relates to the number of groups you have counted (introducing times tables) links to division.</p> <p>An understanding of the more you share between, the less each person will get (e.g. would you prefer to share these grapes between 2 people or 3 people? Why?)</p> <p>Secure understanding of grouping means you count the number of groups you have made. Whereas sharing means you count the number of objects in each group.</p>	
Year	3	4
Layers of vocabulary  Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book	<p>Basic to subject specific (Beck's Tiers): share, share equally one each, two each, three each... group in pairs, threes... tens equal groups of ÷, divide, division, divided by, divided into left, left over, remainder</p> <p>Instructional vocabulary: calculate, work out, solve, investigate question, answer, check</p>	<p>Basic to subject specific (Beck's Tiers): share, share equally one each, two each, three each... group in pairs, threes... tens equal groups of ÷, divide, division, divided by, divided into left, left over, remainder, dividend, divisor</p> <p>Instructional vocabulary: calculate, work out, solve, investigate question, answer, check</p>
NC 2014	Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including 2 digit numbers times 1 digit numbers progressing to formal written methods.	Practise to become fluent in the formal written method of short division with exact answers (see Mathematics Appendix 1).



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Developing Conceptual/ Procedural Understanding	<p>Links to tables</p> <p>For example, use language of division linked to tables using counting stick</p> <p>Using known facts If $3 \times 2 = 6$, then $30 \times 2 = 60$, $60 \div 3 = 20$ and $30 = 60 \div 2$.</p> <p>Partitioning strategy to halve Halve 68</p> <p>Rearranging the dividend to find multiples of the divisor. $48 \div 3 =$ 'What do I know about the 3 x tables?' 'I know $3 \times 10 = 30$ and $3 \times 6 = 18$.'</p> <p>$48 \div 3 = 16$</p>	<p>Place value materials to represent calculations</p> <p>Short division $72 \div 3 =$</p> <p>'72 divided by 3. 7 tens shared equally between 3 is 2 with a remainder of 1 ten. Exchange the 1 ten for 10 units. I now have 12 units which shared equally between 3 is 4. The answer is 24.'</p> <p>Representing problems Andy says 'I can use my three times table to work out $180 \div 3$'. Explain what Andy could do to work out this calculation.</p>	<p>Links to tables</p> <p>For example, use language of division linked to tables using counting stick</p> <p>Using known facts If $2 \times 3 = 6$ then $200 \times 3 = 600$ and $600 \div 3 = 200$</p> <p>Rearranging the dividend to find multiples of the divisor. $69 \div 3 =$ 'What do I know about the 3 x tables?' 'I know $3 \times 10 = 30$ and $3 \times 3 = 9$.'</p> <p>$69 \div 3 = 23$</p>	<p>Place value materials to represent calculations</p> <p>Short division $372 \div 6 =$</p> <p>'372 divided by 6. 3 hundreds cannot be shared equally between 6, so exchange the hundreds for 30 tens. I now have 37 tens which shared equally between 6 is 6 with a remainder of 1 ten. Exchange the ten for 10 units. I now have 12 units which shared equally between 6 is 2. The answer is 62.'</p> <p>Representing problems Alan says that the solution to $186 \div 4$ can be written as '46 remainder 2' or as '46.5'. Do you agree? Explain your answer.</p>
	Known facts	Recall and use \times and \div facts for the 3, 4 and 8 x tables		Recall \times and \div facts for x tables up to 12 x 12.
Essential knowledge	Review division facts (2 x, 5 x and 10 x tables)	Halve 2 digit numbers	Division facts (4x and 8x tables)	10x smaller
	Division facts (4 x table)	Division facts (3 x table)	Division facts (3 x, 6 x and 12 x tables)	Halve larger numbers and decimals
	Division facts (8 x table)	Division facts (6 x table)	Division facts (3 x and 9 x tables)	Division facts (11 x and 7 x tables)

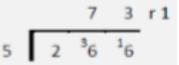
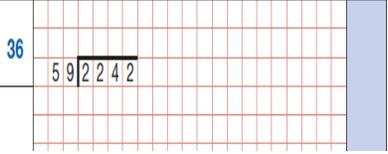


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Year	5	6
Layers of vocabulary  Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book	<p>Basic to subject specific (Beck's Tiers): equal groups of divide, division, divided by, divided into remainder factor, quotient, divisible by inverse</p> <p>Instructional vocabulary: calculate, work out, solve, investigate question, answer, check same, different missing number/s number facts, number pairs, number bonds greatest value, least value</p>	<p>Basic to subject specific (Beck's Tiers): equal groups of divide, division, divided by, divided into remainder factor, quotient, divisible by inverse, remainders as fractions or decimals</p> <p>Instructional vocabulary: calculate, work out, solve, investigate question, answer, check same, different missing number/s number facts, number pairs, number bonds greatest value, least value</p>
NC 2014	Divide numbers up to 4 digits by a 1 digit number using the formal written method of short division and interpret remainders appropriately for the context (as remainders, as fractions, as decimals or by rounding, e.g. $98 \div 4 = \frac{98}{4} = 24 \text{ r}2 = 24 \frac{1}{2} = 24.5 \approx 25$). Solve problems involving multiplication and division including using knowledge of factors and multiples, squares and cubes. Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. Solve problems involving multiplication and division including scaling by simple fractions and problems involving simple rates.	Divide numbers up to 4 digits by a 2 digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate to the context. Divide numbers up to 4 digits by a 2 digit number using the formal written method of short division where appropriate, interpreting remainders according to the context. Solve problems involving addition, subtraction, multiplication and division.



Calculation Policy

<p>Developing Conceptual/ Procedural Understanding</p>	<p>Using known facts If $6 \div 2 = 3$ then $6000 \div 2 = 3000$ and $6000 \div 20 = 300$</p> <p>Place value materials to represent calculations</p> <p>Short division $483 \div 7 =$</p> $\begin{array}{r} 69r1 \\ 7 \overline{) 4864} \end{array}$ <p>"484 divided by 7. 4 hundreds cannot be shared equally between 7, so exchange the hundreds for 40 tens. I now have 48 tens which shared equally between 7 is 6 with a remainder of 6 tens. Exchange the 6 tens for 60 units, we now have 64 units. 64 shared equally between 7 equals 9 remainder 1. The answer is 69 r1."</p>	<p>Interpreting remainders $17 \div 5$ "What do I know? 17 is not a multiple of 5."</p>  <p>$3 \frac{2}{5}$ $3 \frac{2}{5} = 3.4$</p> <p>From knowledge of decimal/fraction equivalents or by converting $\frac{2}{5}$ into $\frac{4}{10}$.</p> <p>Examples:</p> <p>$17 \quad 581 \div 7 =$</p>  <p>$581 \div 7$ could be calculated by the formal written method of short division or it could be calculated by rearranging the dividend, using known facts, into 560 and 21.</p> <p>Representing problems Correct the errors in the calculation below. Explain the error. $266 \div 5 = 73.1$</p> 	<p>Using known facts If $6 \div 2 = 3$ then $6 \div 0.2 = 30$ and $6 \div 0.02 = 300$</p> <p>Short division $97.6 \div 5 =$</p> $\begin{array}{r} 19.52 \\ 5 \overline{) 97.610} \end{array}$ <p>"97.6 divided by 5. 9 tens shared equally between 5 is 1 with a remainder of 4 tens. Exchange the ten for 10 units. I now have 47 units which shared equally between 5 is 9 with a remainder of 2 units. Exchange the 2 units for 20 tenths, we now have 26 tenths. 26 shared equally between 5 equals 5 with a remainder of 1 tenth. Extend the dividend with a 0 in the hundredths column. Exchange the tenth for 10 hundredths. 10 shared equally between 5 equals 2. The answer is 19.52."</p> <p>Long division (thinking not generally recorded) $384 \div 16$</p> <table border="1" data-bbox="1123 876 1249 990"> <tr><td>1</td><td>16</td></tr> <tr><td>2</td><td>32</td></tr> <tr><td>4</td><td>64</td></tr> <tr><td>5</td><td>80</td></tr> <tr><td>8</td><td>128</td></tr> <tr><td>10</td><td>160</td></tr> </table> <p>"What do I know about the divisor?" Record partial tables.</p> $\begin{array}{r} 24 \\ 16 \overline{) 384} \\ \underline{-32} \\ 64 \\ \underline{-64} \\ 0 \end{array}$ <p>(38 tens $\div 16 = 2$ r6; $2 \times 16 = 32$) (bring the 4 down) (64 units $\div 16 = 4$) (no remainder)</p>	1	16	2	32	4	64	5	80	8	128	10	160	 <p>With questions of this type where the divisor is close to a number linked to the times tables, encourage the children to use known facts and adjustment to set up the partial tables.</p> <table border="1" data-bbox="1554 682 1806 836"> <thead> <tr> <th></th> <th>60</th> <th>Adjust</th> <th>59</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>120</td> <td>2</td> <td>118</td> </tr> <tr> <td>2</td> <td>240</td> <td></td> <td>236</td> </tr> <tr> <td>3</td> <td>300</td> <td></td> <td>295</td> </tr> <tr> <td>4</td> <td>480</td> <td></td> <td>472</td> </tr> <tr> <td>5</td> <td>600</td> <td>10</td> <td>590</td> </tr> </tbody> </table> $\begin{array}{r} 14.6 \\ 35 \overline{) 511.0} \\ \underline{35} \\ 16 \\ \underline{14} \\ 21 \\ \underline{21} \\ 0 \end{array}$ <p>Property of the divisor. If prime-partial table Not prime-factorisation. Factorise Representing problems Megan divides 500 by 8 and gets the answer 62r4. She re writes it as 62 r 1/2 . Is she right? Explain your answer.</p>		60	Adjust	59	1	120	2	118	2	240		236	3	300		295	4	480		472	5	600	10	590
1	16																																							
2	32																																							
4	64																																							
5	80																																							
8	128																																							
10	160																																							
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5	600	10	590																																					
<p>Known facts</p>	<p>Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. Recall prime numbers up to 19</p>		<p>Identify common factors, common multiples and prime numbers</p>																																					
<p>Essential knowledge</p>	<p>Division facts (4 x and 8 x tables)</p>	<p>100, 1000 times smaller</p>	<p>Division facts up to 12 x 12</p>	<p>Halve larger numbers and decimals</p>																																				
	<p>Division facts (3 x, 6 x and 12 x tables; 3 x and 9 x tables)</p>	<p>Partition to divide mentally</p>	<p>Apply place value to derive division facts, e.g. $12 \div 3 = 4$ so $1.2 \div 3 = 0.4$</p>	<p>Partition to divide mentally including decimals</p>																																				
	<p>Division facts (11 x and 7 x tables)</p>	<p>Halve larger numbers and decimals</p>																																						



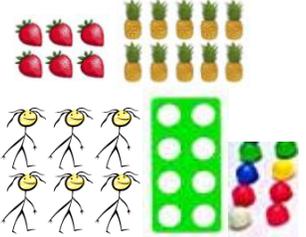
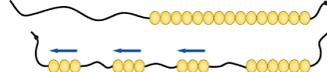
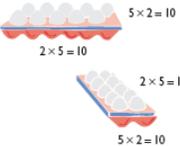
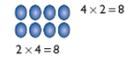
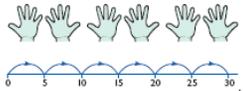
Calculation Policy

Multiplication

EYFS	<p>Reception: ELG 2018 Numbers to 20: place them in order and say which number is one more or one less than a given number Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer They solve problems, including doubling, halving and sharing.</p> <p>Exceeding: Estimation and checking quantities by counting up to 20 Combining groups of 2, 5 or 10 or sharing into equal groups</p>	
Year	1	2



Calculation Policy

<p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p>Basic to subject specific (Beck's Tiers): count in ones, twos... tens... array, groups of, equal groups odd, even</p> <p>Instructional vocabulary: carry on, continue repeat what comes next? find, choose, collect use, make, build tell me, describe, pick out, talk about, explain, show me, read, write, record</p>	<p>Basic to subject specific (Beck's Tiers): lots of, groups of \times, times, multiply, multiplied by multiple of once, twice, three times... ten times... times as (big, long, wide... and so on) repeated addition array row, column double, halve share, share equally</p> <p>Instructional vocabulary: carry on, continue, repeat, what comes next? predict describe the pattern describe the rule find, find all, find different, investigate</p>	
<p>NC 2014</p>	<p>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.</p>	<p>Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals (=) signs.</p>	
<p>Developing Conceptual/ Procedural Understanding</p>	<p>Grouping</p>  <p>2 frogs on each lily pad</p> <p>GROUPING ITP Pictures to show 2 lots of 3 or 3 lots of 2 etc.</p> <p>Doubles</p> 	<p>Arrays (rectangular arrangements to show equal groups)</p>  <p>Repeated addition</p>  <p>Introduce the \times symbol once repeated addition is understood.</p> <p>Grouping</p>  <p>5 frogs on each lily pad $5 \times 3 = 15$</p> 	<p>Commutativity</p>  <p>$2 \times 5 = 10$ $5 \times 2 = 10$</p>  <p>$5 \times 2 = 2 \times 5$</p>  <p>$4 \times 2 = 8$ $2 \times 4 = 8$</p>  <p>$4 \times 2 = 8$ $2 \times 4 = 8$</p>  <p>$5 \times 2 = 10$ $2 \times 5 = 10$</p>



Calculation Policy

			<p>Arrays</p> <p>Building tables</p> <p>Build tables using counting stick- forwards and backwards and with missing jumps</p> <p>See Multiplication Planner</p>	<p> $5 + 5 + 5 + 5 + 5 = 30$ $5 \times 6 = 30$ 5 multiplied by 6 6 groups of 5 6 hops of 5 </p> <p>Decision making</p> <p>How many number sentences can you write to describe this array? Can you use addition, multiplication and division?</p> <p>Explain your answers.</p>
Known facts	Count in multiples of twos, fives and tens.		Recall and use \times and \div facts for the 2, 5 and 10 x tables, including recognising odd and even numbers.	
Essential Knowledge	Count in 2s	Doubles up to 10	2 x table	Doubles up to 20
	Count in 10s	Double multiples of 10	10 x table	Doubles of multiples of 5
	Count in 5s	Count in 2s, 5s and 10s	5x table	Count in 3s

KS1	<p>Pupils should memorise and reason with numbers in 2, 5 and 10 times tables. They should see ways to represent odd and even numbers and know how they are represented in tables. This will help them to understand the pattern in numbers.</p> <p>Pupils should begin to understand multiplication as scaling in terms of double and half (e.g. that tower of cubes is double the height of the other tower). Commutative law shown on array.</p> <p>Repeated addition can be shown mentally on a number line.</p> <p>Inverse relationship between multiplication and division. Use an array to explore how numbers can be organised into groups.</p>	
Year	3	4



Calculation Policy

<p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p>Basic to subject specific (Beck's Tiers): lots of, groups of \times, times, multiply, multiplication, multiplied by multiple of, product once, twice, three times... ten times... times as (big, long, wide... and so on) repeated addition array row, column double, halve share, share equally one each, two each, three each...</p> <p>Instructional vocabulary: carry on, continue repeat what comes next? predict describe the pattern, describe the rule find, find all, find different, investigate choose, decide, collect</p>	<p>Basic to subject specific (Beck's Tiers): lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times... ten times... times as (big, long, wide... and so on) repeated addition array row, column double, halve, factor, multiple</p> <p>Instructional vocabulary: carry on, continue, repeat what comes next? predict describe the pattern, describe the rule pattern, puzzle, calculate, calculation, mental calculation, method, jotting, answer right, correct, wrong what could we try next? How did you work it out? number sentence sign, operation, symbol, equation</p>
<p>NC 2014</p>	<p>Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including 2 digit numbers times 1 digit numbers progressing to formal written methods.</p>	<p>Multiply 2 digit and 3 digit numbers by a 1 digit number using formal written layout. Solve problems involving multiplying and adding. Non-statory Guidance: Pupils write statements about the equality of expressions (for example, use the distributive law $39 \times 7 = 30 \times 7 + 9 \times 7$ and associative law $(2 \times 3) \times 4 = 2 \times (3 \times 4)$). They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, $2 \times 6 \times 5 = 10 \times 6 = 60$.</p>



Calculation Policy

Developing Conceptual/ Procedural Understanding	<p>Building tables</p> <p>For example, build tables using counting stick-forwards and backwards and with missing jumps</p> <p>Using known facts If $3 \times 2 = 6$, then $30 \times 2 = 60$, $60 \div 3 = 20$ and $30 = 60 \div 2$.</p> <p>Associativity $(2 \times 3) \times 4 = 2 \times (3 \times 4)$ </p>	<p>Partitioning strategy to double Double 35</p> <p>Place value materials to represent calculations See Appendix 1</p> <p>Partitioning Informal recording of partitioned numbers $15 \times 5 = 75$</p> <p>$10 \times 5 = 50$ $5 \times 5 = 25$</p> <p>$27 \times 3 = 81$</p> <p>$20 \times 3 = 60$ $7 \times 3 = 21$ "20 multiplied by 3 equals 60 and 7 multiplied by 3 equals 21. 60 add 21 equals 81."</p>	<p>Grid method-To show distributive law $23 \times 8 =$ $20 \times 8 = 160$ $3 \times 8 = 24$ $23 \times 8 = 184$</p> <table border="1"> <tr><td>x</td><td>20</td><td>3</td></tr> <tr><td>8</td><td></td><td></td></tr> </table> <p>Short multiplication Expanded</p> <p>23 $\times 8$ 24 (8 x 3) <u>160</u> (8 x 20) 184</p> <p>leading to compact</p> <p>23 $\times 8$ <u>184</u> 2</p> <p>Representing problems A group of aliens live on Planet Xert. Tinions have three legs, Quinions have four legs. The group has 22 legs altogether. How many Tinions and Quinions might there be? Is there more than one solution?</p>	x	20	3	8			<p>Building tables</p> <p>For example, build tables using counting stick-forwards and backwards and with missing jumps</p> <p>Using known facts If $2 \times 3 = 6$ then $200 \times 3 = 600$ and $600 \div 3 = 200$</p> <p>Distributivity $3 \times (2 + 4) = 3 \times 2 + 3 \times 4$ So the '3' can be 'distributed' across the '2 + 4' into 3 times 2 and 3 times 4</p> <p>leading to</p> <p>$13 \times 4 = 10 \times 4 + 3 \times 4 = 52$</p>	<p>Place value materials to represent calculations</p> <p>Grid method (if needed for conceptual understanding)</p> <p>346×9</p> <table border="1"> <tr><td>x</td><td>300</td><td>40</td><td>6</td></tr> <tr><td>9</td><td></td><td></td><td></td></tr> </table> <p>Short multiplication Expanded</p> <p>346 $\times 9$ 54 (9 x 6) 360 (9 x 40) <u>2700</u> (9 x 300) 3114</p> <p>leading to compact</p> <p>346 $\times 9$ <u>3114</u> 4 5</p>	x	300	40	6	9				<p>Representing problems</p> <p>Multiply a number by itself and then make one factor one more and the other one less. What do you notice? Does this always happen?</p> <p>Eg $4 \times 4 = 16$ $6 \times 6 = 36$ $5 \times 3 = 15$ $7 \times 5 = 35$ Try out more examples to prove your thinking.</p> <p>Place $<$, $>$, or $=$ in these number sentences to make them correct: 50×4 4×50 4×50 40×5 200×5 3×300</p>
	x	20	3																	
8																				
x	300	40	6																	
9																				
Known facts	Recall and use \times and \div facts for the 3, 4 and 8 x tables		Recall \times and \div facts for x tables up to 12×12 .																	
Essential knowledge	Review 2x, 5x and 10x		4x and 8x tables		10x bigger															
	4x table		3x, 6x and 12x tables		Double larger numbers and decimals															
	8 x table		3x and 9x tables		11x and 7x tables															

Year	5		6	
Layers of	Basic to subject specific (Beck's Tiers):		Basic to subject specific (Beck's Tiers):	



Calculation Policy

<p>vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p>lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times... ten times... times as (big, long, wide... and so on) repeated addition array row, column double, halve share, share equally factor, multiple, prime, composite</p> <p>Instructional vocabulary: carry on, continue, repeat what comes next? predict describe the pattern, describe the rule find, find all, find different investigate</p>			<p>lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times... ten times... times as (big, long, wide... and so on) repeated addition array row, column double, halve share, share equally factor, multiple, prime, composite</p> <p>Instructional vocabulary: carry on, continue, repeat what comes next? predict describe the pattern, describe the rule find, find all, find different investigate</p>										
<p>NC 2014</p>	<p>Multiply numbers up to 4 digits by a 1 or 2 digit number using a formal written method, including long multiplication for 2 digit numbers Solve problems involving multiplication and division including using knowledge of factors and multiples, squares and cubes Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign Solve problems involving multiplication and division including scaling by simple fractions and problems involving simple rates</p>			<p>Multiply multi-digit numbers up to 4 digits by a 2 digit whole number using the formal written method of long multiplication. Solve problems involving addition, subtraction, multiplication and division.</p>										
<p>Developing Conceptual/ Procedural Understanding</p>	<p>Building tables</p>  <p>For example, apply tables knowledge to multiples of 10, 100 and 1000 using counting stick- forwards and backwards and with missing jumps</p> <p>Using known facts If $2 \times 3 = 6$ then $2000 \times 3 = 6000$ and</p>	<p>Grid method (if needed for conceptual understanding) 28×27</p> <table border="1" data-bbox="562 1320 688 1385"> <tr><td>x</td><td>20</td><td>8</td></tr> <tr><td>20</td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td></tr> </table> <p>Addition to be done mentally or across followed by column addition</p>	x	20	8	20			7			<p>leading to compact</p> $\begin{array}{r} 28 \\ \times 27 \\ \hline 196 \\ 560 \\ \hline 756 \end{array}$ <p>Extend to HTU x TU or ThHTU x TU as appropriate</p> <p>Representing problems</p>	<p>Building tables</p>  <p>For example, apply tables knowledge to decimals using counting stick- forwards and backwards and with missing jumps</p> <p>Using known facts If $2 \times 3 = 6$ then $0.2 \times 3 = 0.6$ and $0.02 \times 3 = 0.06$</p> <p>Long multiplication Use expanded method first if needed to</p>	<p>If place value is secure, use grid method for decimal multiplication 0.75×6</p> <p>$0.7 \times 6 = 4.2$ $0.05 \times 6 = 0.3$ $0.75 \times 6 = 4.5$</p> <p>Make explicit links between decimals and money</p>
x	20	8												
20														
7														



Calculation Policy

	<p>$200 \times 30 = 6000$</p> <p>Place value materials to represent calculations See Appendix 1</p> <p>Short multiplication Use expanded method first if needed to build conceptual understanding</p> $\begin{array}{r} 4346 \\ \times 8 \\ \hline 34768 \\ 234 \end{array}$	<p>Long multiplication</p> <p>Expanded</p> $\begin{array}{r} 28 \\ \times 27 \\ \hline 56 \text{ (7x8)} \\ 140 \text{ (7x20)} \\ 160 \text{ (20x8)} \\ \hline 400 \text{ (20x20)} \\ \hline 756 \end{array}$	<p>40 cupcakes cost £3.60, how much do 20 cupcakes cost? How much do 80 cupcakes cost? How much do 10 cupcakes cost?</p>	<p>build conceptual understanding</p> $\begin{array}{r} 5172 \\ \times 27 \\ \hline 36204 \\ 15114 \\ \hline 139644 \end{array}$	<table border="1" data-bbox="1602 427 1749 475"> <tr> <td>x</td> <td>0.7</td> <td>0.05</td> </tr> <tr> <td>6</td> <td></td> <td></td> </tr> </table> <p>Representing problems Amy is given the calculation 5413×600. She says "I can do this without a written method." Write down the mental steps you think Amy could do.</p>	x	0.7	0.05	6		
x	0.7	0.05									
6											
Known facts	<p>Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers</p> <p>Recall prime numbers up to 19</p> <p>Recognise and use square and cube numbers and the notation for squared (²) and cubed (³)</p>			Identify common factors, common multiples and prime numbers							
Essential knowledge	4x and 8x tables	100, 1000 times bigger	Multiplication facts up to 12 x 12	Partition to multiply mentally							
	3x, 6x and 12x tables; 3x and 9x tables	10, 100, 1000 times smaller	Apply place value to derive multiplication facts, e.g. $3 \times 4 = 12$ so $3 \times 0.4 = 1.2$	Double larger numbers and decimals							
	11x and 7x tables	Double larger numbers and decimals									



Calculation Policy

Subtraction

<p>EYFS</p>	<p>Reception: ELG 2018 Numbers to 20: place them in order and say which number is one more or one less than a given number Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer They solve problems, including doubling, halving and sharing.</p> <p>Exceeding: Estimation and checking quantities by counting up to 20 Combining groups of 2, 5 or 10 or sharing into equal groups</p>	
<p>Year</p>	<p>1</p>	<p>2</p>
<p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p>Basic to subject specific (Beck's Tiers): take away, distance between, difference between, less than. How many more? How much greater? How many fewer? how much more is...? – subtract, take (away), minus, leave, how many are left/left over? how many have gone? one less, two less, ten less... how many fewer is... than...? how much less is...? difference between half, halve = equals, sign, is the same as</p> <p>Instructional vocabulary: start from, start with, start at look at point, to show me</p>	<p>Basic to subject specific (Beck's Tiers): subtract, subtraction, take (away), minus leave, how many are left/left over? one less, two less... ten less... one hundred less how many fewer is... than...? how much less is...? difference between half, halve = equals, sign, is the same as tens boundary difference, partition, rearrange, inverse, place value</p> <p>Instructional vocabulary: tell me, describe, name, pick out, discuss, talk about, explain, explain your method, explain how you got your answer, give an example of... show how you...</p>
<p>NC 2014</p>	<p>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.</p>	<p>Recording subtraction in columns supports place value and prepares for formal written methods with larger numbers.</p>



Calculation Policy

<p>Developing Conceptual/ Procedural Understanding</p>	<p>Number bonds</p> <p>5 + 7 = 10 10 - 5 = 7</p> <p>4 + 7 = 10 10 - 4 = 6 7 + 6 = 10 10 - 4 = 6</p> <p>9 + 1 = 10 10 - 9 = 1 7 + 9 = 10 10 - 7 = 9</p> <p>Numicon Ten Frame</p> <p>Difference between 7 and 10.</p> <p>2 + <input type="text"/> = 10 10 - <input type="text"/> = 3</p> <p>5 + <input type="text"/> = 10 10 - <input type="text"/> = 9</p> <p><input type="text"/> + 4 = 10 10 - 0 = <input type="text"/></p> <p>Use the pattern to complete the number sentences.</p> <p>10 - 6 = 4 10 - 4 = 6 10 - 3 = 7</p> <p>10 - 5 = 5 10 - 2 = 8</p> <p>6 less than 10 is 4. Count out, then count how many are left. 7 - 4 = 3</p>	<p>Count back on a number track. $15 - 6 = 9$</p> <p>Difference between.</p> <p>13 - 8 = <input type="text"/></p> <p>8 + <input type="text"/> = 13</p> <p>Subtraction-take away</p> <p>Before: 4 1 7 Take away: 4 1 3 Now: 0 0 4</p> <p>Jenny's cakes</p> <p>Cakes left: 7 Cakes eaten: 3</p> <p>8-3=? Subtraction-finding the difference</p> <p>Peter: 8 cakes Jenny: 5 cakes</p> <p>How many more cakes does Peter have than Jenny? 8-3=?</p>	<p>Develop knowledge of fact families.</p> <p>7 = 5 + 2 2 + 5 = 7 7 - 2 = 5 7 - 5 = 2</p> <p>Whole-part model</p> <p>10</p> <p>6 ?</p> <p>10</p> <p>10</p> <p>6 ?</p> <p>10</p> <p>6 ?</p> <p>10</p> <p>6 ?</p> <p>Fill in the missing numbers</p>	<p>Whole-part model</p> <p>27</p> <p>15 ? 100</p> <p>77 ?</p> <p>15 ? 77 ?</p> <p>Fill in the missing numbers All answers to be recorded in a number sentence following any informal recording.</p> <p>Adjustment strategy</p> <p>77 - 9 =</p> <p>77 - 10 + 1 = 67 + 1 = 68</p> <p>(Round and adjust) What is the nearest 10? 55 - 27 =</p> <p>55 - 30 + 3 = 25 + 3 = 28</p> <p>91 - 48 =</p> <p>91 - 50 + 2 = 41 + 2 = 43</p>	<p>Re-arranging</p> <p>35 - 8 =</p> <p>Tell me what you know about 8, e.g. 2 + 6, 5 + 3</p> <p>35 - 8 =</p> <p>Rearrange the 8 into 5 + 3</p> <p>So 35 - 5 - 3 = 30 - 3 = 27</p> <p>55 - 27 =</p> <p>Partition the 27 into 20 + 7 and rearrange the 7 into 5 + 2.</p> <p>So 55 - 27 = 55 - 20 - 5 - 2 = 35 - 5 - 2 = 28</p> <p>Taking away and exchanging</p> <p>73 - 46 =</p> <p>What do we know '60 and 13'.</p> <p>Exchange to make about 76?</p> <p>73 - 46 = 27 Now take away the 46.</p>	<p>Subtract mentally pairs of multiples of 10 using known facts</p> <p>60 - 20 = 40 because 6 - 2 = 4</p> <p>Partitioning of the second number strategy</p> <p>74 - 47</p> <p>74 - 40 = 34</p> <p>34 - 4 - 3 = 27</p> <p>Balance in the equation</p> <p>35 - <input type="text"/> = 31</p> <p><input type="text"/> - 12 = 34</p> <p>20 - <input type="text"/> = 14 - 3 (Open-ended)</p> <p>18 - <input type="text"/> = 15 - <input type="text"/></p> <p>Decision making</p> <p>27 - <input type="text"/> = 12</p> <p>Sam works out 27 - 15 = 12.</p> <p>How could he have done this?</p>
<p>Known facts</p>	<p>Represent & use number bonds and related subtraction facts within 20</p> <p>Add and subtract 1 digit and 2 digit numbers to 20, including zero</p>		<p>Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.</p>			
<p>Essential knowledge</p>	<p>1 less</p>	<p>Number bonds: subtraction 5 and 6</p>	<p>10 less</p>	<p>Number bonds: subtraction 20, 12 and 13</p>		
	<p>Count back</p>	<p>Number bonds: subtraction 7 and 8</p>	<p>Subtract 1 digit from 2 digit by bridging</p>	<p>Number bonds: subtraction 14 and 15</p>		
	<p>Subtract 10.</p>	<p>Number bonds: subtraction 9 and 10</p>	<p>Partition second number and count back in tens then ones.</p>	<p>Number bonds: subtraction 16 and 17</p>		
	<p>Teens subtract 10</p>	<p>Difference between</p>	<p>Subtract 10 and multiples of 10.</p>	<p>Number bonds: subtraction 18 and 19</p>		
			<p>Subtract near multiples of 10.</p> <p>Add near multiples of 10.</p>	<p>Difference between</p>		



Calculation Policy

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KS1	<p>Pupils should practise subtraction to 20 and within to become increasingly fluent. They should use the facts they know to derive others, e.g using $10 - 7 = 3$ and $7 = 10 - 3$ to calculate $100 - 70 = 30$ and $70 = 100 - 30$. Know the effect of zero.</p> <p>As well as number lines, 100 squares could be used to model calculations such as $74 - 11$, $77 - 9$ or $36 - 14$, where partitioning or adjusting are used. Pupils should learn to check their calculations, including by adding to check. They should continue to see subtraction as both take away and finding the difference and should find a small difference by counting up. They should use Dienes to model partitioning into tens and ones* and learn to partition numbers in different ways e.g. $23 = 20 + 3 = 10 + 13$.</p>	
Year	3	4
<p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p>Basic to subject specific (Beck's Tiers): subtract, subtraction, take (away), minus leave, how many are left/left over? one less, two less... ten less... one hundred less how many fewer is... than...? how much less is...? difference between half, halve = equals, sign, is the same as tens boundary, hundreds boundary exchange, carried digits</p> <p>Instructional vocabulary: explain your method explain how you got your answer give an example of... show how you... show your working</p>	<p>Basic to subject specific (Beck's Tiers): subtract, subtraction, take (away), minus, decrease leave, how many are left/left over? difference between half, halve how many more/fewer is... than...? how much more/less is...? equals, sign, is the same as tens boundary, hundreds boundary, inverse exchange, carried digits</p> <p>Instructional vocabulary: calculate, work out, solve investigate, question answer check</p>



Calculation Policy

NC 2014	Add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction. Least significant digit is always dealt with first to establish if the exchange is needed.		Add and subtract numbers with up to 4 digits using the formal written method of columnar addition and subtraction where appropriate. Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.									
Developing Conceptual/ Procedural Understanding Columns to be headed HTU	<p>Subtract mentally pairs of multiples of 100 using known facts $600 - 200 = 400$ because $6 - 2 = 4$</p> <p>Remodelling strategy (keeping the difference the same) $502 - 198$ $504 - 200 = 304$</p> <p>Re-arranging Use of apparatus to understand rearrangements, e.g. 55 as 40 and 15(not as part of calculations).</p> <p>Place value materials to represent calculations Diennes and then place value counters.</p>	<p>Start with least significant digit - decomposition</p> $\begin{array}{r} 81 = 80 \quad 1 \\ - 57 \quad \underline{50 \quad 7} \\ \hline \end{array}$ $\begin{array}{r} 81 = 70 \quad 11 \\ - 57 \quad \underline{50 \quad 7} \\ \hline 24 \quad \underline{20 \quad 4} \end{array}$ <p>“1 subtract 7 is tricky so I will rearrange 81 into 70 and 11. 11 subtract 7 equals 4 and 70 subtract 50 equals 20. 20 and 4 make 24.”</p> $\begin{array}{r} 754 \quad 700 \quad 50 \quad 4 \\ - 86 \quad \underline{\quad 80 \quad 6} \\ \hline \end{array}$ $\begin{array}{r} 754 \quad 600 \quad 140 \quad 14 \\ - 86 \quad \underline{\quad 80 \quad 6} \\ \hline 668 \quad \underline{600 \quad 60 \quad 8} \end{array}$ <p>“It’s tricky to take 6 from 4 and 80 from 50. I need to rearrange the number. I will exchange one ten from 50 which leaves 40 and makes 14 in the units. 40 to subtract 80 is tricky. I will exchange one hundred from 700 and make 140. 14 subtract 6 equals 8. 140 subtract 80 equals 60 and 600 subtract 0 equals 600.”</p>	<p>Columnar subtraction</p> $\begin{array}{r} \\ 754 \\ - 286 \\ \hline 468 \end{array}$ <p>Emphasis on language of place value, i.e. 14 units subtract 6 units, 14 tens subtract 8 tens, and 6 hundreds subtract 2 hundreds.</p> <p>Representing problems There are 386 pupils at Oak Primary. If 79 pupils have sandwiches, how many have dinners?</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>386</td></tr> <tr><td>?</td></tr> <tr><td>79</td></tr> </table>	386	?	79	<p>Subtract mentally pairs of multiples of 1000 using known facts $6000 - 2000 = 4000$ because $6 - 2 = 4$</p> <p>Remodelling strategy (keeping the difference the same) $3548 - 1998$ $3550 - 2000 = 1550$</p> <p>Find the difference strategy $13.6 - 2.8 =$</p> <p>$13.6 - 2.8 = 10.8$</p>	<p>Columnar subtraction $2344 - 187$</p> $\begin{array}{r} \\ 2344 \\ - 187 \\ \hline 2157 \end{array}$ $6467 - 2684$ $\begin{array}{r} \\ 6467 \\ - 2684 \\ \hline 3783 \end{array}$ <p>Columnar subtraction (decimals) in contexts such as money and measurement</p> $32.34 - 14.18$ $\begin{array}{r} \\ 32.34 \\ - 14.18 \\ \hline 18.16 \end{array}$	<p>Representing problems Check the answer to the following calculations using the inverse. Show all your working.</p> <p>$2456 - 734 = 1822$</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>2456</td></tr> <tr><td>1822</td></tr> <tr><td>734</td></tr> </table>	2456	1822	734
386												
?												
79												
2456												
1822												
734												
Known facts	Derive and use addition and subtraction facts to 100, e.g. $33 + 67 = 100$.		Derive and use addition and subtraction facts (for multiples of 10) to 1000, e.g. $330 + 670 = 1000$.									
Essential	Subtract single digit bridging	Subtract multiples of 10,100	Fluency of 2 digit - 2 digit	Subtract multiples of 10, 100 and								



Calculation Policy

knowledge	through boundaries			1000
	Partition second number to subtract	Pairs of 100 (complements of 100)	Partition second number to subtract	Decimal subtraction from 10 or 1
	Difference between	Subtract near multiples of 10 and 100 by rounding and adjusting	Difference between	Subtract near multiples by rounding and adjusting
	Partition and recombine			

Year	5		6	
Layers of vocabulary  Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book	Basic to subject specific (Beck's Tiers): subtract, subtraction, take (away), minus, leave, how many are left/left over? ten less... one hundred less how many fewer is... than...? how much less is...? difference between half, halve = equals, sign, is the same as tens boundary, hundreds boundary, inverse, units boundary, tenths boundary exchange, carried digits Instructional vocabulary: put, place arrange, rearrange change, change over adjusting, adjust split, separate		Basic to subject specific (Beck's Tiers): subtract, subtraction, take (away), minus, decrease leave, how many are left/left over? difference between half, halve how many more/fewer is... than...? how much more/less is...? equals, sign, is the same as tens boundary, hundreds boundary, units boundary, tenths boundary, inverse Instructional vocabulary: put, place arrange, rearrange change, change over adjusting, adjust split, separate carry on, continue, repeat what comes next? predict describe the pattern, describe the rule find, find all, find different investigate	
NC 2014	Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction). Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.		Solve problems involving addition, subtraction, multiplication and division.	
Developing Conceptual/ Procedural Understanding	Columnar subtraction $\begin{array}{r} & 2 & 3 & 1 \\ 5 & 2 & 3 & 4 \\ - & 1 & 1 & 8 & 7 \\ \hline 5 & 1 & 1 & 5 & 7 \end{array}$ Include calculations with 'empty columns'. 324.9 - 7.25	Representing problems Kangchenjunga is the third highest mountain in the world at 28,169 feet above sea level. Lhotse is the fourth highest at 27,960 feet above sea level. Find the difference in heights mentally. 122, 456 - 11,999 122, 457 - 12,000	Columnar subtraction Include calculations with up to 3 'empty columns'. 128.7 - 3.014 $\begin{array}{r} & 6 & 9 & 1 \\ 128 & 7 & 0 & 0 \\ - & 3 & 0 & 1 & 4 \\ \hline 125 & 6 & 8 & 6 \end{array}$	Representing problems Katie was given the calculation below 47326 - 1900 = She said "I will just take off 2000 then subtract another 100 so my answer is 45126." Is she correct? Would you use her method? Explain your answer



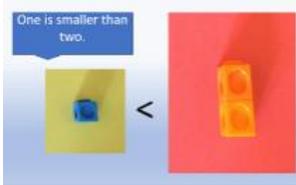
Calculation Policy

	$\begin{array}{r} 1181 \\ 324.80 \\ - 7.25 \\ \hline 317.65 \end{array}$			
Known facts	Derive and use addition and subtraction facts to 10 and 1, e.g. $3.3 + 6.7 = 10$ leads to $10 - 3.3 = 6.7$ and $0.33 + 0.67 = 1$ so $1 - 0.67 = 0.33$		All the KS2 required facts	
Essential knowledge	Fluency of 2 digit - 2 digit including with decimals	Subtract multiples of 10, 100, 1000 and tenths	Fluency of 2 digit - 2 digit including with decimals	Subtract multiples of 10, 100, 1000, tenths and hundredths
	Partition second number to subtract	Use number facts, bridging and place value	Partition second number to subtract	Use number facts, bridging and place value
	Adjust numbers to subtract	Difference between	Adjust numbers to subtract	Difference between



Calculation Policy

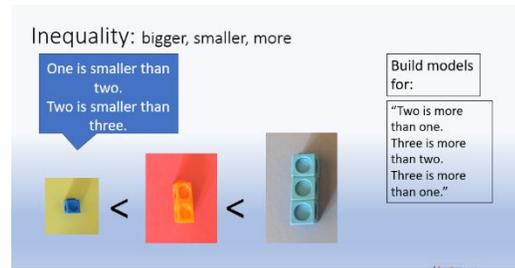
EFYS Numbers and Calculation

Nursery: 22-36 months				
<p>Selects a small number of objects from a group when asked, for example, 'please give me one', 'please give me two'.</p> <p>Creates and experiments with symbols and marks representing ideas of number</p> <p>Begins to make comparisons between quantities.</p> <p>Uses some language of quantities, such as 'more' and 'a lot'</p> <p>Knows that a group of things changes in quantity when something is added or taken away.</p>				
Representations	Key knowledge and vocabulary	Concrete & pictorial Conceptual modelling	Abstract Skills and knowledge	Application across the environment
   	<p>Concepts of quantity, equality and inequality.</p> <p>Modelling combining sets of small quantities.</p> <p>Modelling adding to a quantity to make it bigger.</p> <p>Removing objects from a set to show the amount is now smaller.</p>	<p>Natural materials and physical objects in all environments.</p> <p>Pictures to show one or two items.</p> <p>Objects and resources to physically represent a quantity. Images and pictures to represent a small quantity.</p> <p>Using dishes/hoops to make quantities of different values that visually show one set has more than the other.</p> <p>Images of quantities to</p>	<p>Spoken number names. <i>One, once, alone, first.</i></p> <p>Mark making and graphics to represent a small number in the context of play.</p> <p>Mark making and graphics to represent a small quantity to compare</p>	<p>Wonderful one and terrific two displays.</p> <p>Hiding objects find one of, or lots of in the sand, across the setting.</p> <p>Matching one item to another then to one image. Repeat with two.</p> <p>Snack time: one piece of fruit to one person, two pieces each</p> <p>Problem solving: "We need one/two each how</p>



Calculation Policy

		compare. Which has more	in the context of play.	can we sort the bears?"
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Nursery/Reception: 30 - 50 months Knows that numbers identify how many objects are in a set. Beginning to represent numbers using fingers, marks on paper or pictures. Sometimes matches numeral and quantity correctly. Compares two groups of objects, saying when they have the same number. Separates a group of three or four objects in different ways, beginning to recognise that the total is still the same. Shows an interest in representing numbers.					
Representations	Key Vocabulary	Key knowledge	Concrete & pictorial Conceptual modelling	Abstract Skills and knowledge	Application across the environment
 	Layers of vocabulary  Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book Basic to subject specific (Beck's Tiers): Add, more, and, make, sum, total, altogether,	Concepts of cardinality, equality, inequality and rearranging the same quantity. Counting to 3. One to one correspondence. Knowing how many are in the set. Comparing numbers 1,2 and 3 – 'bigger' and 'smaller' Stable ordering numbers 1 to 3.	Natural materials and physical objects in all environments to count. (cardinality) Pictures to show a quantity that can be counted. Use fingers to show small amounts. Images and pictures to represent a small quantity.	Represent a quantity by drawing. Mark making and graphics to represent a small quantity and attempts at numerals. Mark making and drawings to replicate the	Construction. What can you make with 3 / 4 bricks? Small world. Put three carriages on the train. How many cars are in the car park? How many skittles have you knocked over?



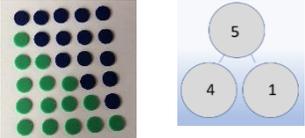
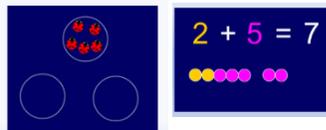
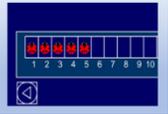
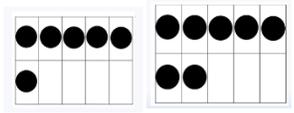
Calculation Policy

	<p>double, how many</p> <p>Instructional vocabulary: Listen, join in, say, start from, look at, carry on</p>	<p>3 is made up of 2 and 1.</p> <p>Using counting strategies and subitising to identify the number of concrete objects in the set.</p>	<p>Resources that match a numeral to a quantity. E.g. a number track, digits cards with numerals and quantities represented.</p>	<p>concrete and pictorial model.</p> <p>With models, attempts to write numerals and continue to mark make.</p>	<p>Mark making and graphics to represent a small number in the context of play.</p>
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<p>Reception: 40 - 60 months</p> <p>Counts up to three or four objects by saying one number name for each item.</p> <p>Counts objects to 10 and beginning to count beyond 10.</p> <p>Selects the correct numeral to represent 1 to 5, then 1 to 10 objects.</p> <p>Uses the language of 'more' and 'fewer' to compare two sets of objects.</p> <p>Finds the total number of items in two groups by counting all of them.</p> <p>Says the number that is one more than a given number.</p> <p>In practical activities and discussion, beginning to use the vocabulary involved in adding and subtracting.</p>					
	Key Vocabulary	Key knowledge and	Concrete & pictorial	Abstract	Application across

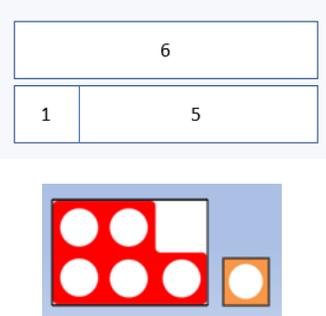


Calculation Policy

Representations		vocabulary	Conceptual modelling	Skills and knowledge	the environment
   	<p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary</p> <p>Appendix 1b: Vocabulary book</p> <p>Basic to subject specific (Beck's Tiers): Add, more, and, make, sum, total, altogether, double, how many more to make, how many are left, how many have gone?</p> <p>Instructional vocabulary: Listen, join in, say, start from, look at, carry on, what comes next, find, choose, talk about</p>	<p>Number structure. Equality, inequality. Partitioning and recombining.</p> <p>Subitising to 5. 5 as an anchor.</p> <p>Modelling the combining of sets, recognising that the quantity has increased.</p> <p>Using counting strategies and subitising to identify the number of concrete/pictorial objects in the set</p>	<p>Natural materials, physical objects and mathematical resources e.g. counters in all environments to count accurately. (cardinality). To 10 and beyond. Pictures to show a quantity that can be counted then to 10 and beyond.</p> <p>Resources that match a numeral to a quantity</p> <p>Models of mathematical counting resources to show the more or fewer.</p> <p>Using a number track or line to show one more than a given number</p>	<p>Represent a quantity by drawing or by using graphics. (using drawings to show a resource)</p> <p>Mark making and graphics to represent numbers to 10 and beyond in their play.</p> <p>Graphics and attempts at numerals in the correct orientation.</p> <p>Mark making and numerals to replicate the concrete and pictorial model. Graphics and numerals to show the addition</p>	<p>Malleable play: problem solving 'Let's put 5 cherries on the cakes.' 'How will you put your 5 candles on the two cakes?'</p> <p>Role play: problem solving Each shelf in the shop must have 5 or more items to sell. How shall we arrange the items?</p> <p>Find items in the sand. 3 shells and 2 fish. How many items altogether?</p>



Calculation Policy

Reception: ELG 2018					
Numbers to 20: place them in order and say which number is one more or one less than a given number Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer They solve problems, including doubling, halving and sharing.					
Representations	Key Vocabulary	Key knowledge and vocabulary	Concrete & pictorial Conceptual modelling	Abstract Skills and knowledge	Application across the environment
	Layers of vocabulary  Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book Basic to subject specific (Beck's	Number structure. Equality, inequality. Partitioning and recombining. Subitising to 5. 5 as an anchor. Modelling the combining of sets, recognising that the quantity has increased.	Natural materials, physical objects and mathematical resources e.g. counters in all environments to count accurately. (cardinality). To 10 and beyond. Pictures to show a quantity that can be	Represent a quantity by drawing or by using graphics. (using drawings to show a resource) Mark making and graphics to represent numbers to 10 and beyond in their play.	Malleable play: problem solving 'Let's put 5 cherries on the cakes.' 'How will you put your 5 candles on the two cakes?' Role play: problem solving Each shelf in the



Calculation Policy

<p> $3 + \square = 6$ $1 + 5 = \square$ $\square + 0 = 6$ $3 + 3 = \square$ $5 + \square = 6$ </p> <p> $6 = 6 + \square$ $6 = \square + 5$ $6 = 2 + \square$ $6 = \square + 3$ $6 = \square + \square + 3$ </p>	<p>Tiers): Add, more, and, make, sum, total, altogether, double, how many more to make, how many are left, how many have gone? One less, two less, ten less, the difference between, odd and even.</p> <p>Instructional vocabulary: Listen, join in, say, start from, look at, carry on, what comes next, find, chose, talk about, repeat, tell me, describe, complete</p>	<p>Using counting strategies and subitising to identify the number of concrete/pictorial objects in the set</p>	<p>counted then to 10 and beyond.</p> <p>Resources that match a numeral to a quantity</p> <p>Models of mathematical counting resources to show the more or fewer.</p> <p>Using a number track or line to show one more than a given number</p>	<p>Graphics and attempts at numerals in the correct orientation.</p> <p>Mark making and numerals to replicate the concrete and pictorial model.</p> <p>Graphics and numerals to show the addition</p>	<p>shop must have 5 or more items to sell. How shall we arrange the items?</p> <p>Find items in the sand. 3 shells and 2 fish. How many items altogether?</p>
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Reception: ELG 2018

Numbers to 20: place them in order and say which number is one more or one less than a given number

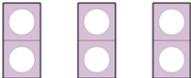
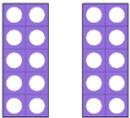
Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer

They solve problems, including doubling, halving and sharing.

Representations	Key Vocabulary	Key knowledge	Concrete & pictorial Conceptual modelling	Abstract Skills and knowledge	Application across the environment
	Layers of vocabulary	Knowing that groups of	Natural materials,	Represent a quantity by	In small world play:



Calculation Policy

 <p>Counting in 2s</p>  <p>Counting in 5s</p>  <p>Double 10 is 20.</p>  <p>8 divided in to groups of 2.</p>	 <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p> <p>Basic to subject specific (Beck's Tiers): Add, more, and, make, sum, total, altogether, double, how many more to make, how many are left, how many have gone? One less, two less, ten less, the difference between, odd and even. Equals, share, groups of, halve and half</p> <p>Instructional vocabulary: Listen, join in, say, start from,</p>	<p>the same quantity are added together. That is what makes a double.</p> <p>The quantity divided into two equal groups. Halving.</p> <p>Sharing and grouping.</p> <p>Sharing is where you take a quantity and count out into how many equal groups you want.</p> <p>Grouping is where you take the quantity and make the groups (of two, or three etc)</p>	<p>physical objects and mathematical resources e.g. counters in all environments to double, share, group and half accurately.</p> <p>Modelling and demonstrating groups of and shared quantities.</p> <p>Showing that the quantity has increased when doubled and reduced when halved.</p>	<p>drawing or by using graphics. (using drawings to show a resource)</p> <p>Graphics and numerals to show the double/halving/grouping and sharing used.</p>	<p>All the animals in the enclosures are doubles. How many lions will there be etc?</p> <p>Doubles shop Everything in the shop has to be double.</p> <p>Snack time How will we share the fruit so that we can have half each?</p>
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Calculation Policy

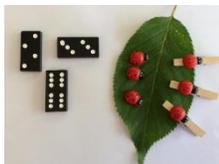
	look at, carry on, what comes next, find, choose, talk about, repeat, tell me, describe, complete, pattern, remember, ring, work out, check, another way				
<p>4 shared equally into two groups.</p>					
					
<p>To halve the apple it would be cut into two equal pieces</p>					
<p>To halve the satsuma we would count the segments and share them equally.</p>					
					



Calculation Policy

Double the number of ladybirds.

This show half the number of lady birds sitting on the leaf.



Doubling and

halving.