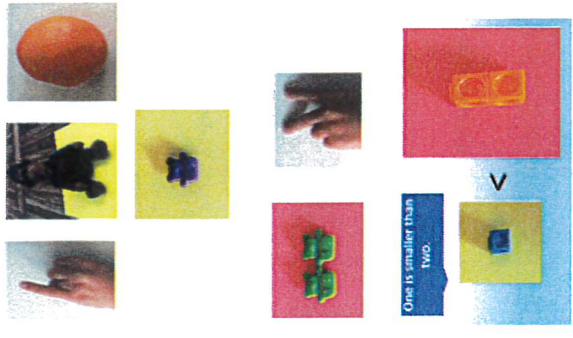




Calculation Policy

Agreed by Governors: Spring 2020
To be reviewed: Spring 2023

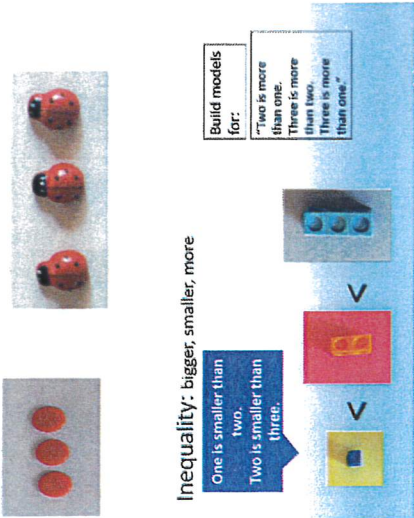
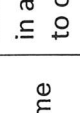
EYFS Policy for Number & Calculation

<p>Nursery: 22-36 months Selects a small number of objects from a group when asked, for example, 'please give me one', 'please give me two'. Creates and experiments with symbols and marks representing ideas of number Begins to make comparisons between quantities. Uses some language of quantities, such as 'more' and 'a lot' 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 compare. Which has more?</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 in the context of play.</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 can we sort the bears?"</p>

EYFS Policy for Number & Calculation

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.

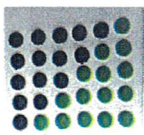
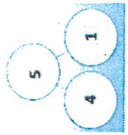
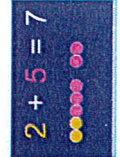
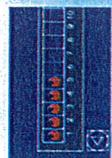
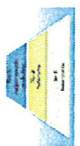
Representations	Key Vocabulary	Key knowledge	Concrete & pictorial modelling	Abstract Skills and knowledge	Application across the environment
 <p>Inequality: bigger, smaller, more</p> <p>One is smaller than two. Two is smaller than three.</p> <p>Build models for: "Two is more than one. Three is more than two. Three is more than one."</p>	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, double, how many Instructional vocabulary:	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. 3 is made up of 2 and 1. Using counting strategies and subitising to identify the number of	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. Resources that match a numeral to a quantity. E.g. a number track, digits cards with numerals and quantities represented.	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 concrete and pictorial model.	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? Mark making and graphics to represent a small number in the context of play.

EYFS Policy for Number & Calculation


	Listen, join in, say, start from, look at, carry on	concrete objects in the set.		With models, attempts to write numerals and continue to mark make.
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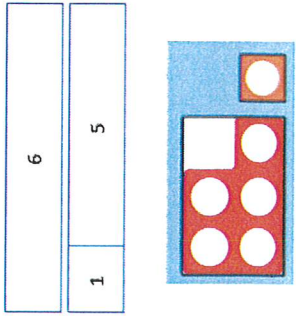
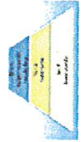
Reception: 40 - 60 months

Counts up to three or four objects by saying one number name for each item.
 Counts objects to 10 and beginning to count beyond 10.
 Selects the correct numeral to represent 1 to 5, then 1 to 10 objects.
 Uses the language of 'more' and 'fewer' to compare two sets of objects.
 Finds the total number of items in two groups by counting all of them.
 Says the number that is one more than a given number.
 In practical activities and discussion, beginning to use the vocabulary involved in adding and subtracting.

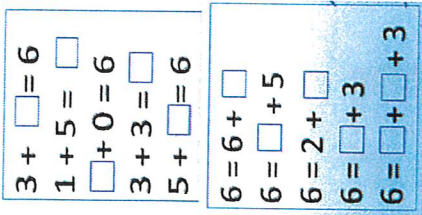
Representations	Key Vocabulary	Key knowledge and vocabulary	Concrete & pictorial Conceptual modelling	Abstract Skills and knowledge	Application across the environment
   	Layers of vocabulary  Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book Basic to subject specific (Beck's Tiers):	Number structure. Equality, inequality. Partitioning and recombining. Subtitising 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 counted then to 10 and beyond.	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 shop must have 5 or more items to sell.

EYFS Policy for Number & Calculation

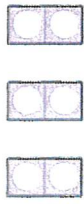
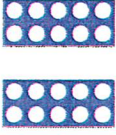


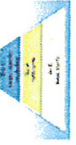
	<p>Add, more, and, make, sum, total, altogether, double, how many more to make, how many are left, how many have gone?</p> <p>Instructional vocabulary: Listen, join in, say, start from, look at, carry on, what comes next, find, choose, talk about</p>	<p>Using counting strategies and subitising to identify the number of concrete/pictorial objects in the set</p>	<p>Resources that match a numeral to a quantity</p> <p>Models of mathematical counting resources to show the more or fewer. 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>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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<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>					
Representations	Key Vocabulary	Key knowledge and vocabulary	Concrete & pictorial Conceptual modelling	Abstract Skills and knowledge	Application across the environment
	<p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary</p> <p>Appendix 1b: Vocabulary book</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>Natural materials, physical objects and mathematical resources e.g. counters in all environments to count accurately. (cardinality). To 10 and beyond.</p>	<p>Abstract Skills and knowledge</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>Application across the environment</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</p>



EYFS Policy for Number & Calculation

 <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.</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>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>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>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>
<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>Representations</p>	<p>Key Vocabulary</p> <p>Layers of vocabulary</p>	<p>Key knowledge</p> <p>Concrete & pictorial Conceptual modelling</p> <p>Natural materials, physical objects and mathematical</p>	<p>Abstract Skills and knowledge</p> <p>Represent a quantity by drawing or by using graphics. (using</p>	<p>Application across the environment</p> <p>In small world play:</p>

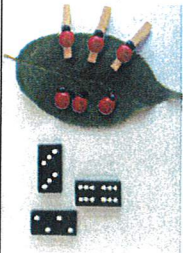
EYFS Policy for Number & Calculation

 <p>Counting in 2s</p>  <p>Counting in 5s</p>  <p>Double 10 is 20.</p>  <p>8 divided into groups of 2.</p>  <p>4 shared equally into two groups.</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? 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, look at, carry on, what comes next, find, choose, talk about, repeat, tell</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>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>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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EYFS Policy for Number & Calculation

 <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>	 <p>Double the number of ladybirds. This show half the number of lady birds sitting on the leaf.</p>	<p>me, describe, complete, pattern, remember, ring, work out, check, another way</p>		

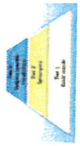
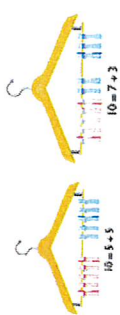





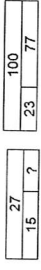
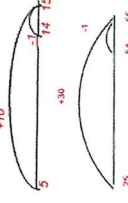
EYFS Policy for Number & Calculation



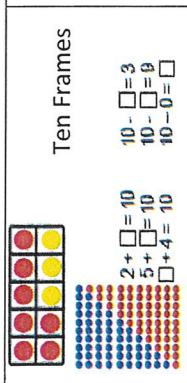
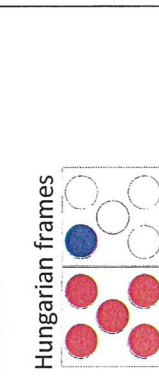
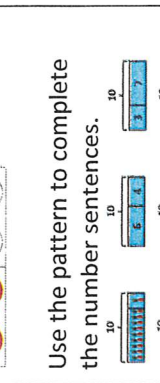
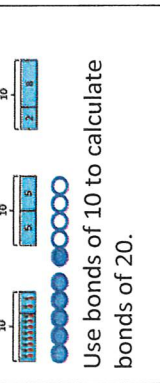

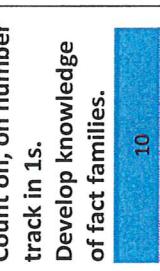
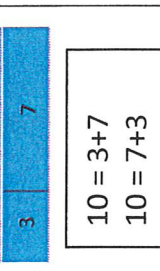
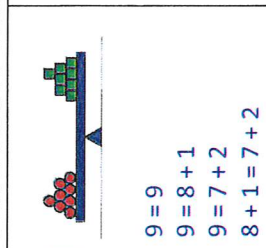
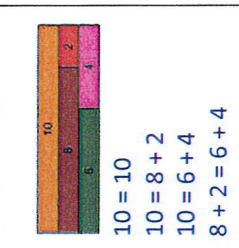
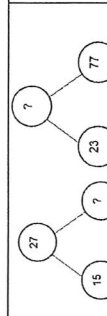
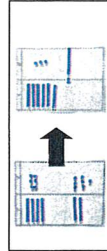
Doubling and halving.

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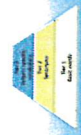
Addition KS1

Reception: ELG 2018				
EYFS	<p>Numbers to 20: place them in order and say which number is one more or one less than a given number</p> <p>Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer</p> <p>They solve problems, including doubling, halving and sharing.</p> <p>Exceeding:</p> <p>Estimation and checking quantities by counting up to 20</p> <p>Combining groups of 2, 5 or 10 or sharing into equal groups</p>			
Year				
1	2			
<p>Layers of vocabulary</p>  <p>Appendix 1a</p> <p>Beck's Tiers of Vocabulary</p> <p>Appendix 1b:</p> <p>Vocabulary book</p> <p>NC 2014</p>	<p>Basic to subject specific (Beck's Tiers):</p> <p>+, add, more plus make, sum, total altogether score double, more, two more... ten more... how many more is... than...? how much more is...?</p> <p>Instructional vocabulary:</p> <p>start from, start with, start at</p> <p>look at point, to show me</p> <p>Instructional vocabulary:</p> <p>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>Using concrete objects and pictorial representations, including those involving numbers, quantities and measures □ applying their increasing knowledge of mental and written methods</p> <p>Concrete, pictorial, abstract</p>			
<p>Developing Conceptual/Procedural Understanding</p> <p>Number bonds</p>  <p>We have 10 pegs on the coat hangers, how can we split them into 2 groups? Is there another way? How can we be sure we have got them all?</p> 	<p>Whole-part model</p>  <p>Fill in the missing numbers</p> <p>Balance image for concept of equality.</p>  <p>Recognise small quantities</p> 	<p>Base 10</p>  <p>Whole-part model</p> 	<p>Adjustment strategy</p> <p>$5 + 9 =$</p> <p>$5 + 10 - 1 = 14$</p>  <p>(Round and adjust)</p> <p>Doubles then near doubles</p>	<p>Partition and recombine</p> <p>Record partitioned steps in number sentences then add mentally.</p> <p>$40 + 20 = 60$</p> <p>$6 + 7 = 13$</p> <p>$60 + 13 = 73$</p> <p>Moving on to:</p> <p>$46 + 27 = 60 + 13 = 73$</p>

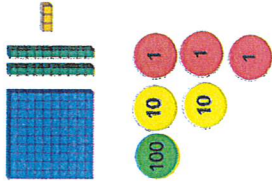
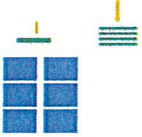
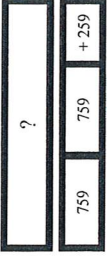
Addition KS1

	<p>Ten Frames</p>  <p>Hungarian frames</p>  <p>Use the pattern to complete the number sentences.</p>  <p>Use bonds of 10 to calculate bonds of 20.</p> 	<p>Count on</p>  <p>Count on, on number track in 1s. Develop knowledge of fact families.</p>  	 <p>9 = 9 9 = 8 + 1 9 = 7 + 2 8 + 1 = 7 + 2</p>  <p>10 = 10 10 = 8 + 2 10 = 6 + 4 8 + 2 = 6 + 4</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>$5 + 3 + 4 = 13$ $6 + 3 + 4 + 7 + 2 = 22$</p> <p>Record thinking.</p>	<p>5 + 6 = 5 + 5 + 1 = 11 7 + 8 = 8 + 8 - 1 = 15</p> <p>47 + 50 =</p> <p>Re-arranging 18 + 4 = Tell me what you know about 4, e.g. 3 + 1, 2 + 2 18 + 4 = Rearrange the 4 into 2 + 2 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>Regrouping the 10.</p> <p>Balance in the equation 14 = 8 + 6, 7 + 6 = 8 + 5 $\square = 13 + 9$ 3 + $\square = 16$ 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>
<p>Known facts</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 more Largest number first. Add 10. Ten plus ones. Doubles up to 10.</p>	<p>Number bonds: 5 and 6 Number bonds: 7 and 8 Number bonds: 9 and 10 Use number bonds of 10 to derive bonds of 11</p>	<p>10 more Add 1 digit to 2 digit by bridging Partition second number and add tens then ones. Add 10 and multiples of 10. Doubles up to 20 and multiples of 5. Add near multiples of 10.</p>	<p>Number bonds: 20, 12 and 13 Number bonds: 14 and 15 Number bonds: 16 and 17 Number bonds: 18 and 19 Partition and recombine.</p>		


Addition KS2

<p>KS1</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. Use pictorial representations such as bar models and whole part diagrams to show additive relationships. 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. They should continue to see addition as both combining groups and counting on. They should use Dienes to model partitioning into tens and ones* and learn to rearrange numbers in different ways e.g. $23 = 20 + 3 = 10 + 13$. 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>NC 2014</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>Add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction.</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>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>			
<p>Developing Conceptual/ Procedural Understanding</p>	<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>Start with least significant digit</p> $\begin{array}{r} 67 \\ + 24 \\ \hline 91 \end{array}$ <p>$11 (7+4)$ $+ 80 (60+20)$ $\hline 91$</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>Columnar addition</p> $\begin{array}{r} 625 \\ + 48 \\ \hline 673 \\ 1 \end{array}$ <p>Teach the carried digit.</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 $3548 + 1998$ $3548 + 2000 = 5546$</p> <p>Place value materials to represent calculations</p>	<p>Columnar addition (decimals) in contexts such as money and measurement</p> $\begin{array}{r} 12.45 \\ 7.36 \\ + 24.50 \\ \hline 44.31 \\ 111 \end{array}$ <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>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>


Addition KS2

<p>Remodelling strategy $243 + 198$ $241 + 200 = 441$</p> <p>Place value materials to represent 3 digit numbers Base 10 and then place value counters.</p> 	 <p>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>Representing problems There are 334 children at Springfield School and 75 at Oak Nursery. How many children are there altogether?</p>	<p>7648 +1486 ----- 14 (8+6) 120 (40+80) 1000 (600+400) + 8000 (7000+1000) ----- 9134</p> <p>7648 + 1486 ----- 9134 111</p>	
<p>Known facts</p>	<p>Derive and use addition and subtraction facts to 100, e.g. $33+67 = 100$.</p>			<p>Derive and use addition and subtraction facts (for multiples of 10) to 1000, e.g. $330+670=1000$.</p>
<p>Essential knowledge</p>	<p>Add single digit bridging through boundaries</p> <p>Partition second number to add</p> <p>Use near doubles to add</p> <p>Partition and recombine</p>	<p>Add multiples of 10,100</p> <p>Pairs of 100 (complements of 100)</p> <p>Add near multiples of 10 and 100 by rounding and adjusting</p>	<p>Fluency of 2 digit + 2 digit</p> <p>Partition second number to add</p> <p>Use near doubles to add</p> <p>Add near multiples</p>	<p>Add multiples of 10, 100 and 1000</p> <p>Decimal pairs of 10 and 1</p> <p>Adjust both numbers before adding</p> <p>Partition and recombine</p>

Addition KS2

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): add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make...?</p> <p>Instructional vocabulary: put, place arrange, rearrange change, change over split, separate</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: 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>
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	<p>Columnar addition Include calculations involving more than 2 numbers and carrying figures >1.</p> $\begin{array}{r} 25567 \\ 16397 \\ +15984 \\ -57948 \\ \hline 1121 \end{array}$ <p>Include calculations with 'empty columns'. $124.9 + 7.25$</p> $\begin{array}{r} 124.90 \\ + 7.25 \\ \hline 132.25 \\ 11 \end{array}$	<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 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>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>
Known facts	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.	
Essential knowledge	<p>Fluency of 2 digit + 2 digit including with decimals</p> <p>Partition second number to add</p> <p>Adjust numbers to add</p>	<p>Fluency of 2 digit + 2 digit including with decimals</p> <p>Partition second number to add</p> <p>Adjust numbers to add</p> <p>Add multiples of 10, 100, 1000 and tenths</p> <p>Use number facts, bridging and place value</p> <p>Partition and recombine</p>

Subtraction KS1

<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 Layers of vocabulary  Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p style="text-align: center;">1</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>NC 2014</p>	<p style="text-align: center;">2</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>Using concrete objects and pictorial representations, including those involving numbers, quantities and measures □ applying their increasing knowledge of mental and written methods</p> <p>Concrete, pictorial, abstract</p>

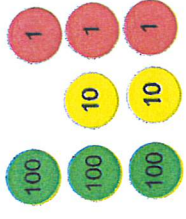
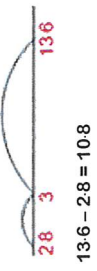
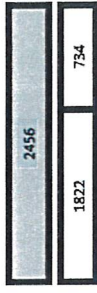
Subtraction KS1

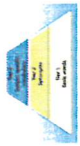
<p>Developing Conceptual/Procedural Understanding</p>	<p>Number bonds</p> <p>Ten Frames</p> <p>Difference between 7 and 10.</p> $2 + \square = 10$ $5 + \square = 10$ $\square + 4 = 10$ <p>Use the pattern to complete the number sentences.</p> <p>6 less than 10 is 4. Count out, then count how many are left. Remove from the set. $7 - 4 = 3$</p>	<p>Count back on a number track. $15 - 6 = 9$</p> <p>Difference between.</p> $13 - 8 = \square$ $8 + \square = 13$ <p>Subtraction-take away</p> <p>$8 - 3 = ?$</p> <p>Subtraction-finding the difference</p>	<p>Develop knowledge of fact families.</p> <p>Whole-part model</p> <p>Fill in the missing numbers</p>	<p>Whole-part model</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> $77 - 9 =$ $77 - 10 + 1 = 67 + 1 = 68$ <p>(Round and adjust) What is the nearest 10? $55 - 27 = 25 + 3 = 28$ $91 - 48 = 90 - 50 + 2 = 42$</p>	<p>Re-arranging</p> <p>$35 - 8 =$ Tell me what you know about 8, e.g. $2 + 6, 5 + 3$ $35 - 8 =$ Rearrange the 8 into $5 + 3$ So $35 - 5 - 3 = 30 - 3 = 27$ $55 - 27 =$ Partition the 27 into 20 + 7 and rearrange the 7 into $5 + 2$. So $55 - 27 = 55 - 20 - 5 - 2 = 35 - 5 - 2 = 28$</p> <p>Taking away and exchanging</p> <p>What do we know about 76? $73 - 46 = 27$ Now take away the 46.</p>	<p>Subtract mentally pairs of multiples of 10 using known facts $60 - 20 = 40$ because $6 - 2 = 4$</p> <p>Partitioning of the second number strategy</p> $74 - 47$ $74 - 40 = 34$ $34 - 4 - 3 = 27$ <p>Balance in the equation</p> $35 - \square = 31$ $\square - 12 = 34$ (Open-ended) $20 - \square = 14 - 3$ $18 - \square = 15 - \square$ <p>Decision making $27 - \square = 12$ Sam works out $27 - 15 = 12$. How could he have done this?</p>
<p>Known facts</p>	<p>Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.</p> <p>10 less</p> <p>Number bonds: subtraction 5 and 6</p> <p>Count back</p> <p>Number bonds: subtraction 7 and 8</p> <p>Subtract 10.</p> <p>Number bonds: subtraction 9 and 10</p> <p>Teens subtract 10</p> <p>Difference between</p> <p>Difference between</p> <p>Difference between</p>					
<p>Essential knowledge</p>	<p>10 less</p>	<p>Subtract 1 digit from 2 digit by bridging</p>	<p>Partition second number and count back in tens then ones.</p>	<p>Subtract 10 and multiples of 10.</p>	<p>Number bonds: subtraction 20, 12 and 13</p> <p>Number bonds: subtraction 14 and 15</p> <p>Number bonds: subtraction 16 and 17</p> <p>Number bonds: subtraction 18 and 19</p> <p>Difference between</p>	

Subtraction KS2

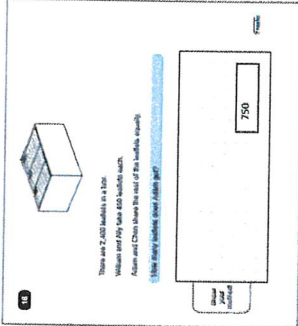
<p>KS1</p>	<p>Pupils should practise subtraction to 20 and within to become increasingly fluent. They should use the facts they know to derive others, e.g using $10 - 7 = 3$ and $7 = 10 - 3$ to calculate $100 - 70 = 30$ and $70 = 100 - 30$. Know the effect of zero.</p> <p>As well as number lines, 100 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>
<p>Year</p>	<p style="text-align: center;">3</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>Year</p>	<p style="text-align: center;">4</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> <p>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.</p>
<p>Developing Conceptual/Procedural Understanding</p>	<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</p> <p>Start with least significant digit - decomposition $81 = 80 + 1$ $57 = 50 + 7$ $24 = 20 + 4$</p> <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> <p>Columnar subtraction $\begin{array}{r} 600 \\ - 200 \\ \hline 400 \end{array}$</p> <p>Emphasis on language of place value, i.e. 14 units subtract 6 units, 14 and 6 hundreds subtract 2 hundreds.</p>
<p>NC 2014</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>
<p>Representing problems</p>	<p>Check the answer to the following calculations using the inverse. Show all your working.</p> <p>Columnar subtraction $2344 - 187$</p> $\begin{array}{r} 21\ 3\ 1 \\ 2344 \\ - 187 \\ \hline 2157 \end{array}$ <p>Remodelling strategy (keeping the difference the same) $6467 - 2684$ 6131 $6467 - 2684$ 3783</p> <p>Columnar subtraction (decimals) in contexts such as money and</p> <p>Check the answer to the following calculations using the inverse. Show all your working.</p> <p>3 The children of Flanders School are making money for charity. The English collected £200. Six for Pops have collected £17.75. How much more money do they need to make their target?</p> <p>£</p> <p>£17.75</p>

Subtraction KS2

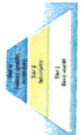


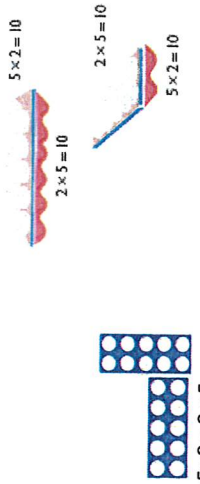
	<p>40 and 15(not as part of calculations).</p> <p>Place value materials to represent numbers in calculations</p> 	<p>247 - 138 =</p> <table border="0"> <tr> <td>H</td> <td>30</td> <td>T</td> <td>U</td> </tr> <tr> <td>200</td> <td>40</td> <td>37</td> <td>7</td> </tr> <tr> <td>100</td> <td>30</td> <td>10</td> <td>7</td> </tr> <tr> <td>100</td> <td>0</td> <td>8</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td></td> <td>9</td> </tr> </table>	H	30	T	U	200	40	37	7	100	30	10	7	100	0	8	0				9	<p>Representing problems</p> <p>There are 386 pupils at Oak Primary. If 79 pupils have sandwiches, how many have dinners?</p> <table border="1"> <tr> <td>386</td> <td>79</td> </tr> <tr> <td>?</td> <td></td> </tr> </table>	386	79	?		<p>+02</p> <p>28 3</p> <p>136 - 28 = 108</p> <p>Place value materials to represent calculations Appendix 1.</p> 	<p>measurement</p> <p>32.34 - 14.18</p> $\begin{array}{r} 2121 \\ 32.34 \\ -14.18 \\ \hline 18.16 \end{array}$	<p>2456 - 734 = 1822</p> 
H	30	T	U																											
200	40	37	7																											
100	30	10	7																											
100	0	8	0																											
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<p>Essential knowledge</p>	<p>Subtract single digit bridging through boundaries</p> <p>Partition second number to subtract</p> <p>Difference between</p> <p>Partition and recombine</p>	<p>Subtract multiples of 10,100</p> <p>Pairs of 100 (complements of 100)</p> <p>Subtract near multiples of 10 and 100 by rounding and adjusting</p>	<p>Fluency of 2 digit - 2 digit</p> <p>Partition second number to subtract</p> <p>Difference between</p>	<p>Subtract multiples of 10, 100 and 1000</p> <p>Decimal subtraction from 10 or 1</p> <p>Subtract near multiples by rounding and adjusting</p>																										

<p>Year</p> <p>Layers of vocabulary</p>  <p>Appendix 2a</p> <p>Beck's Tiers of Vocabulary</p> <p>Appendix 2b:</p> <p>Vocabulary book</p> <p>NC 2014</p>	<p>5</p> <p>Basic to subject specific (Beck's Tiers):</p> <p>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</p> <p>Instructional vocabulary:</p> <p>put, place arrange, rearrange change, change over adjusting, adjust split, separate</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>6</p> <p>Basic to subject specific (Beck's Tiers):</p> <p>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</p> <p>Instructional vocabulary:</p> <p>put, place arrange, rearrange change, change over adjusting, adjust split, separate</p> <p>carry on, continue, repeat what comes next? predict describe the pattern, describe the rule</p> <p>find, find all, find different investigate</p> <p>Solve problems involving addition, subtraction, multiplication and division.</p>
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Subtraction KS2

<p>Developing Conceptual/ Procedural Understanding</p>	<p>Columnar subtraction</p> $\begin{array}{r} 2\ 3\ 1 \\ 52844 \\ - 1187 \\ \hline 51157 \end{array}$ <p>Include calculations with 'empty columns'.</p> $\begin{array}{r} 1181 \\ 32490 \\ - 725 \\ \hline 31765 \end{array}$	<p>Representing problems</p> <p>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.</p> <p>Keeping the difference, the same to make the numbers easier to calculate with.</p> $122,456 - 11,999$ $122,457 - 12,000$	<p>Columnar subtraction</p> <p>Include calculations with up to 3 'empty columns'.</p> $128.7 - 3.014$ $\begin{array}{r} 6\ 9\ 11 \\ 128.700 \\ - 3.014 \\ \hline 125.686 \end{array}$	<p>Representing problems</p> <p>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</p>  <p>There are 2,400 biscuits in a box. William and Ivy take 450 biscuits each. How many biscuits does Chloe have? Show the rest of the biscuits evenly.</p> <p>How many biscuits does Chloe get?</p> <table border="1" data-bbox="694 347 805 660"> <tr> <td>450</td> <td>450</td> <td>?</td> </tr> <tr> <td colspan="3">2,400</td> </tr> </table>	450	450	?	2,400		
450	450	?								
2,400										
<p>Known facts</p>	<p>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 $1 - 0.67 = 0.33$</p>									
<p>Essential knowledge</p>	<p>Fluency of 2 digit - 2 digit including with decimals</p>	<p>Fluency of 2 digit - 2 digit including with decimals</p>	<p>Fluency of 2 digit - 2 digit including with decimals</p>	<p>Subtract multiples of 10, 100, 1000, tenths and hundredths</p>						
	<p>Partition second number to subtract</p>	<p>Use number facts, bridging and place value</p>	<p>Partition second number to subtract</p>	<p>Use number facts, bridging and place value</p>						
	<p>Adjust numbers to subtract</p>	<p>Difference between</p>	<p>Adjust numbers to subtract</p>	<p>Difference between</p>						

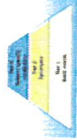
Multiplication KS1

EYFS	<p>Reception: ELG 2018</p> <p>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 Layers of vocabulary  Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book	<p style="text-align: center;">1</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 style="text-align: center;">2</p> <p>Basic to subject specific (Beck's Tiers): lots of, groups of x, 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>
NC 2014	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.	Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs.
Developing Conceptual/Procedural Understanding	<p>Grouping  2 frogs on each lily pad</p> <p>GROUPING ITP Pictures to show 2 groups of 3 or 3 groups of 2 etc.</p>	<p>Repeated addition  Introduce the x symbol once repeated addition is understood.</p> <p>Commutativity  5 x 2 = 2 x 5</p>


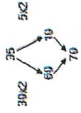


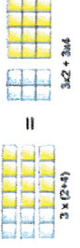
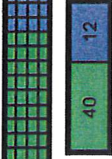

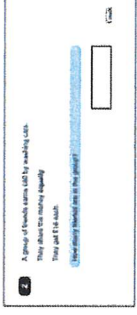

Multiplication KS1

	<p>Doubles</p>	<p>5 frogs on each lily pad $5 \times 3 = 15$</p>	<p>Grouping</p> <p>5 frogs on each lily pad $5 \times 3 = 15$</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.			
Essential Knowledge	Count in 2s	Doubles up to 10	2 x table	
	Count in 10s	Double multiples of 10	10 x table	
	Count in 5s	Count in 2s, 5s and 10s	5x table	
				Doubles up to 20
				Doubles of multiples of 5
				Count in 3s

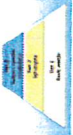
Multiplication KS2

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).</p> <p>Commutative law shown on array. Repeated addition can be shown mentally on a number line. Inverse relationship between multiplication and division. Use an array to explore how numbers can be organised into groups.</p>
<p>Year</p> <p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary</p> <p>Appendix 1b: Vocabulary book</p>	<p style="text-align: center;">3</p> <p>Basic to subject specific (Beck's Tiers): lots of, groups of x, 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, find, find all, find different, investigate choose, decide, collect</p>
NC 2014	<p style="text-align: center;">4</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 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>Multiply 2 digit and 3 digit numbers by a 1 digit number using formal written layout. Solve problems involving multiplying and adding.</p>

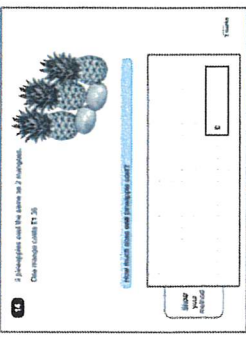
Multiplication KS2

<p>Developing Conceptual/Procedural Understanding</p>	<p>Building tables  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>Partitioning strategy to double Double 35 </p> <p>Place value materials to represent calculations</p> <p>Partitioning Informal recording of partitioned numbers $15 \times 5 = 75$ $10 \times 5 = 50$ $5 \times 5 = 25$ $27 \times 3 = 81$ $20 \times 3 = 60$ $7 \times 3 = 21$ "20 multiplied by 3 equals 60 and 7 multiplied by 3 equals 21. 60 add 21 equals 81."</p>	<p>Grid method $23 \times 8 = 160$ $20 \times 8 = 160$ $3 \times 8 = 24$ $23 \times 8 = 184$</p> <p></p> <p>Short multiplication Expanded 23×8 $24 (8 \times 3)$ $160 (8 \times 20)$ 184</p> <p>leading to compact 23×8 184 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>	<p>Building tables  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></p> <p>leading to $13 \times 4 = 10 \times 4 + 3 \times 4 = 52$</p> <p></p>	<p>Place value materials to represent calculations</p> <p>Grid method (if needed for conceptual understanding)</p> <p>346×9</p> <p></p> <p>Short multiplication Expanded 346×9 $54 (9 \times 6)$ $360 (9 \times 40)$ $2700 (9 \times 300)$ 3114</p> <p>leading to compact 346×9 3114 45</p>	<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></p> <p></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>
<p>Known facts</p>	<p>Recall and use \times and \div facts for the 3, 4 and 8 \times tables</p>	<p>Recall \times and \div facts for \times tables up to 12×12.</p>	<p>Recall \times and \div facts for \times tables up to 12×12.</p>	<p>Recall \times and \div facts for \times tables up to 12×12.</p>	<p>Recall \times and \div facts for \times tables up to 12×12.</p>	<p>Recall \times and \div facts for \times tables up to 12×12.</p>
<p>Essential knowledge</p>	<p>Review $2 \times$, $5 \times$ and $10 \times$</p> <p>4x table</p> <p>8 x table</p>	<p>Double 2 digit numbers</p> <p>3x table</p> <p>6x table</p>	<p>4x and 8x tables</p> <p>3x, 6x and 12x tables</p> <p>3x and 9x tables</p>	<p>10x bigger</p> <p>Double larger numbers and decimals</p> <p>11x and 7x tables</p>	<p>10x bigger</p> <p>Double larger numbers and decimals</p> <p>11x and 7x tables</p>	<p>10x bigger</p> <p>Double larger numbers and decimals</p> <p>11x and 7x tables</p>

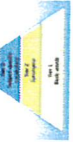
Multiplication KS2

Year	5	6																																		
<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, multiply, multiplication, multiplied by multiple of, product once, twice, three times... ten times... times as (big, long, wide... and so on) 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>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 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</p> <p>Solve problems involving multiplication and division including using knowledge of factors and multiples, squares and cubes</p> <p>Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</p> <p>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.</p> <p>Solve problems involving addition, subtraction, multiplication and division.</p>																																		
<p>Developing Conceptual/ Procedural Understanding</p>	<p>Building tables 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 $200 \times 30 = 6000$</p> <p>Place value materials to represent calculations</p> <p>Grid method (if needed for conceptual understanding) 28×27</p> <table border="1" data-bbox="1029 1612 1077 1713"> <tr><td>2</td><td>8</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> <p>Long multiplication Expanded 28×27</p> <table border="1" data-bbox="1268 1590 1380 1713"> <tr><td>56</td><td>(7x8)</td></tr> <tr><td>140</td><td>(7x20)</td></tr> <tr><td>160</td><td>(20x8)</td></tr> <tr><td>400</td><td>(20x20)</td></tr> <tr><td>756</td><td></td></tr> </table>	2	8		7			56	(7x8)	140	(7x20)	160	(20x8)	400	(20x20)	756		<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 build conceptual understanding</p> <table border="1" data-bbox="1212 1097 1356 1187"> <tr><td>5172</td><td></td></tr> <tr><td>x 27</td><td></td></tr> <tr><td>36204</td><td></td></tr> <tr><td>11151</td><td></td></tr> <tr><td>103440</td><td></td></tr> <tr><td>139644</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> <p>if place value is secure, use grid method for decimal multiplication 0.75×6</p> <table border="1" data-bbox="1173 380 1252 616"> <tr><td>x</td><td>0.7</td><td>0.05</td></tr> <tr><td>6</td><td></td><td></td></tr> </table> <p>Make explicit links between decimals and money</p>	5172		x 27		36204		11151		103440		139644		x	0.7	0.05	6		
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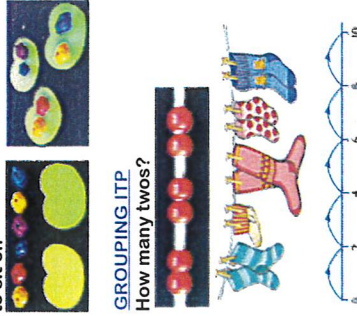

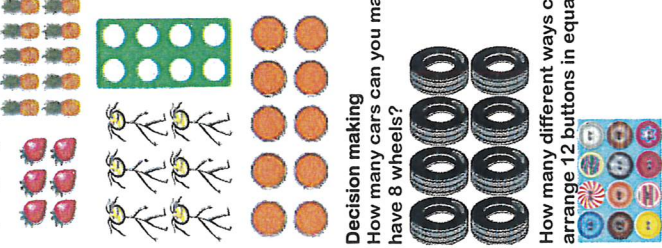



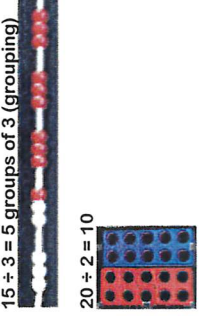
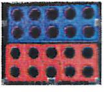

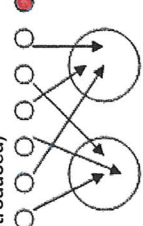

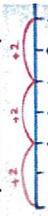



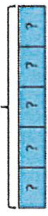
Multiplication KS2

	<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>The image shows a math problem with pineapples and a price tag for £1.35. The problem asks to calculate the total cost for 2 pineapples. The price tag shows £1.35. Below the price tag are two colored boxes, one yellow and one red.</p>
<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 Recognise and use square and cube numbers and the notation for squared (²) and cubed (³)</p>				<p>Identify common factors, common multiples and prime numbers</p>
<p>Essential knowledge</p>	<p>4x and 8x tables 3x, 6x and 12x tables; 3x and 9x tables 11x and 7x tables</p>	<p>100, 1000 times bigger 10, 100, 1000 times smaller Double larger numbers and decimals</p>			<p>Multiplication facts up to 12 x 12 Apply place value to derive multiplication facts, e.g. 3 x 4 = 12 so 3 x 0.4 = 1.2</p> <p>Partition to multiply mentally Double larger numbers and decimals</p>

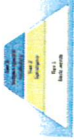
Division KS1

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>	
<p>Year</p> <p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p style="text-align: center;">1</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 style="text-align: center;">2</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 \div, 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>
NC 2014	<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>
	Concrete, pictorial, abstract	Concrete, pictorial, abstract


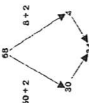
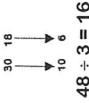


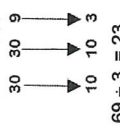
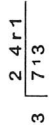
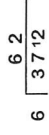
Division KS1

<p>Developing Conceptual/Procedural Understanding</p>	<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>$15 \div 3 = 5$ (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/remainers introduced)</p>  <p>$7 \div 2 = 3r1$</p>	<p>Arrays representing the dividend</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>Number of cakes in each box = 6 $30 \div 5 = 6$</p>
<p>Known facts</p>	<p>Count in multiples of twos, fives and tens.</p>			<p>Recall and use x and ÷ facts for the 2, 5 and 10 x tables, including recognising odd and even numbers.</p>
<p>Essential Knowledge</p>	<p>Count back in 2s Count back in 10s</p>	<p>Halves up to 10 Halve multiples of 10</p>	<p>Division facts (2 x table) Division facts (10 x table) Division facts (5 x table)</p>	<p>Halves up to 20 Review division facts (2 x, 5 x, 10 x tables) Count back in 3s</p>
<p>Tests of divisibility</p>	<p>All even numbers will divide by 2</p>			<p>All numbers ending in 5 and 0 will divide by 5</p>


Division KS2

<p>KS1</p>	<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>
<p>Year</p> <p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary Appendix 1b: Vocabulary book</p>	<p style="text-align: center;">3</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 \div, 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>
<p>NC 2014</p>	<p style="text-align: center;">4</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 \div, 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> <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>Practise to become fluent in the formal written method of short division with exact answers.</p>

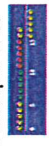


Division KS2

<p>Developing Conceptual/Procedural Understanding</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 $3 \times 2 = 6$, 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>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>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>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>$3 \overline{) 69} = 23$</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>
<p>Known facts</p>	<p>Recall and use \times and \div facts for the 3, 4 and 8 x tables</p>	<p>Recall \times and \div facts for \times tables up to 12×12.</p>	<p>Recall \times and \div facts for \times tables up to 12×12.</p>	<p>Recall \times and \div facts for \times tables up to 12×12.</p>
<p>Essential knowledge</p>	<p>Review division facts (2 x, 5 x and 10 x tables)</p> <p>Division facts (4 x table)</p> <p>Division facts (8 x table)</p> <p>KS1: 2, 5, 10</p>	<p>Halve 2 digit numbers</p> <p>Division facts (3 x table)</p> <p>Division facts (6 x table)</p> <p>Any number with a digit sum of a multiple of 3, will divide equally by 3</p>	<p>Division facts (4x and 8x tables)</p> <p>Division facts (3 x, 6 x and 12 x tables)</p> <p>Division facts (3 x and 9 x tables)</p> <p>Any number with a digit sum of a multiple of 3, will divide equally by 3</p> <p>KS1: 2, 5, 10</p>	<p>10x smaller</p> <p>Halve larger numbers and decimals</p> <p>Division facts (11 x and 7 x tables)</p> <p>Any number with a digit sum of a multiple of 3 and is even will divide equally by 6</p>
<p>Tests of divisibility</p>	<p>Division facts (8 x table)</p> <p>KS1: 2, 5, 10</p>	<p>Division facts (6 x table)</p> <p>Any number with a digit sum of a multiple of 3, will divide equally by 3</p>	<p>Division facts (3 x and 9 x tables)</p> <p>Any number with a digit sum of a multiple of 3, will divide equally by 3</p> <p>KS1: 2, 5, 10</p>	<p>Division facts (11 x and 7 x tables)</p> <p>Any number with a digit sum of a multiple of 3 and is even will divide equally by 6</p>

Division KS2

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	<p>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. $98 \div 4 = 24 \text{ r}2 = 24 \frac{1}{2} = 24.5 \approx 25$).</p> <p>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>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.</p> <p>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.</p> <p>Solve problems involving addition, subtraction, multiplication and division.</p>

Division KS2

<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> $\begin{array}{r} 69 \\ 7 \overline{) 483} \\ \underline{42} \\ 63 \\ \underline{63} \\ 0 \end{array}$ <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>$3 \frac{2}{5} = 3.4$</p> <p>From knowledge of decimal/fraction equivalents or by converting $\frac{2}{5}$ into $\frac{4}{10}$.</p> <p>Examples:</p> $\begin{array}{r} 17 \\ 5 \overline{) 85} \\ \underline{5} \\ 35 \\ \underline{35} \\ 0 \end{array}$ <p>$581 \div 7 =$</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> $\begin{array}{r} 73.1 \\ 5 \overline{) 266} \\ \underline{10} \\ 16 \\ \underline{15} \\ 11 \\ \underline{10} \\ 1 \end{array}$	<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> $\begin{array}{r} 19.52 \\ 5 \overline{) 97.6} \\ \underline{5} \\ 47 \\ \underline{45} \\ 26 \\ \underline{25} \\ 16 \\ \underline{15} \\ 16 \\ \underline{15} \\ 10 \\ \underline{10} \\ 0 \end{array}$ <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> $\begin{array}{r} 24 \\ 16 \overline{) 384} \\ \underline{32} \\ 64 \\ \underline{64} \\ 0 \end{array}$ <p>"What do I know about the divisor?" Record partial tables.</p>	 <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="343 414 502 660"> <tr><th></th><th>60</th><th>120</th><th>180</th><th>240</th><th>300</th><th>360</th></tr> <tr><th>1</th><td>60</td><td>120</td><td>180</td><td>240</td><td>300</td><td>360</td></tr> <tr><th>2</th><td>120</td><td>240</td><td>360</td><td>480</td><td>600</td><td>720</td></tr> <tr><th>3</th><td>180</td><td>360</td><td>540</td><td>720</td><td>900</td><td>1080</td></tr> <tr><th>4</th><td>240</td><td>480</td><td>720</td><td>960</td><td>1200</td><td>1440</td></tr> <tr><th>5</th><td>300</td><td>600</td><td>900</td><td>1200</td><td>1500</td><td>1800</td></tr> <tr><th>6</th><td>360</td><td>720</td><td>1080</td><td>1440</td><td>1800</td><td>2160</td></tr> <tr><th>7</th><td>420</td><td>840</td><td>1260</td><td>1680</td><td>2100</td><td>2520</td></tr> <tr><th>8</th><td>480</td><td>960</td><td>1440</td><td>1920</td><td>2400</td><td>2880</td></tr> <tr><th>9</th><td>540</td><td>1080</td><td>1620</td><td>2160</td><td>2700</td><td>3240</td></tr> </table> <p>Representing problems Megan divides 500 by 8 and gets the answer 62 r4. She re writes it as 62 r 1/2. Is she right? Explain your answer.</p> <p>Using factors to simplify long division $25 \overline{) 815}$</p> $\begin{array}{r} 32.6 \\ 25 \overline{) 815} \\ \underline{50} \\ 315 \\ \underline{250} \\ 65 \\ \underline{50} \\ 15 \\ \underline{15} \\ 0 \end{array}$ <p>Simplify the fractions for remainders</p>		60	120	180	240	300	360	1	60	120	180	240	300	360	2	120	240	360	480	600	720	3	180	360	540	720	900	1080	4	240	480	720	960	1200	1440	5	300	600	900	1200	1500	1800	6	360	720	1080	1440	1800	2160	7	420	840	1260	1680	2100	2520	8	480	960	1440	1920	2400	2880	9	540	1080	1620	2160	2700	3240
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<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>Identify common factors, common multiples and prime numbers</p>																																																																							
<p>Essential knowledge</p>	<p>Division facts (4 x and 8 x tables) Division facts (3 x, 6 x and 12 x tables; 3 x and 9 x tables) Division facts (11 x and 7 x tables)</p>	<p>100, 1000 times smaller Partition to divide mentally Halve larger numbers and decimals</p>	<p>Halve larger numbers and decimals Partition to divide mentally including decimals</p>																																																																							
<p>Tests of divisibility</p>	<p>Tests for 2,3,5,6 & 10</p>	<p>Any number with a digit sum of a multiple of 9 will divide equally by 9</p>	<p>Any number where the last two digits are divisible by 4, will all divide by 4</p>																																																																							