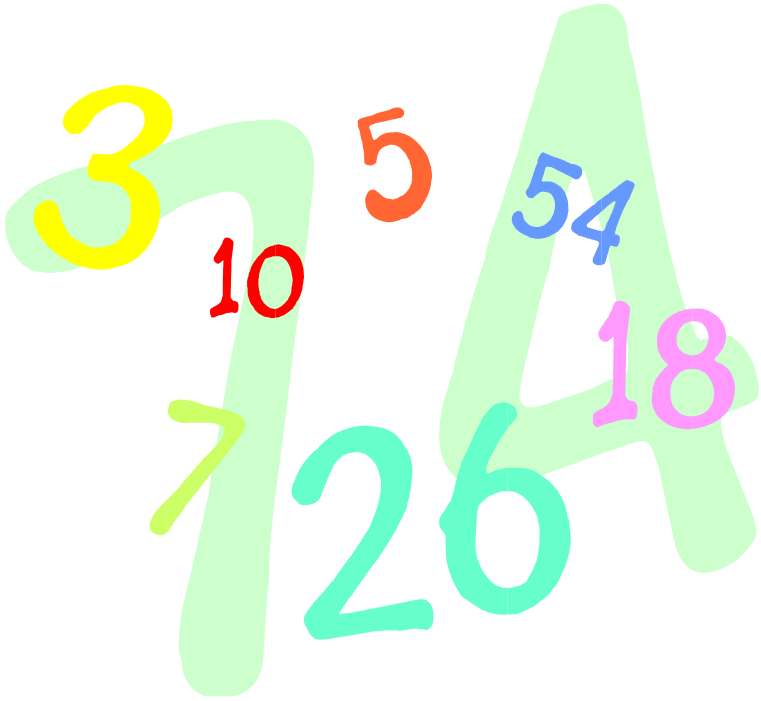
The Blake CE School Calculation Policy



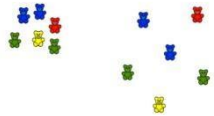
Introduction:

Children are introduced to the processes of calculation through practical, oral and mental activities, including games and puzzles in order to promote confidence and enjoyment of maths throughout the curriculum. As they begin to understand the underlying ideas, they develop ways of recording to support their thinking and calculation methods, so that they develop both **conceptual understanding** and **fluency** in the fundamentals of mathematics. Whilst interpreting signs and symbols involved with calculation, orally in the first instance, children use models and images to support their mental and written methods of calculation. As children's mental methods are strengthened and refined they begin to work more efficiently, which will support them with using succinct written calculation strategies as they are developed. This calculation policy is to be used alongside resources such as the 'Maths No Problem' and 'Power Maths' books and Key Instant Recall of facts document (KIRFS).

<u>From Early Years to Year 1:</u>

There are fundamental skills that it is important for children to develop an early understanding of as building blocks to future learning in maths, including that linked to calculation. A selection of the skills include:

- Ordinality – 'the ordering of numbers in relation to one another' – e.g. (1, 2, 3, 4, 5…)
- Cardinality – 'understanding the value of different numbers' – e.g. (7 =  17 =  +  12 
- Equality – 'seven is the same total as four add three' – e.g.  = 
- Subitising – 'instantly recognizing the number of objects in a small group, without counting them' – e.g.  → five
- Conservation of number – 'recognising that a value of objects are the same, even if they are laid out differently' – e.g.

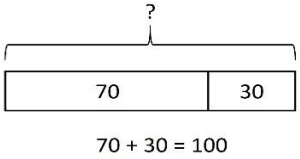


- One-to-one correspondence – e.g. 

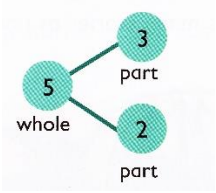
- Counting on and back from any number – e.g. ‘five add three more totals eight’  ‘ten take away three totals seven’ 

- Using apparatus and objects to represent and communicate thinking – e.g. 

- Maths language – using mathematical words verbally in every-day situations – e.g. ‘climb up to the top’ / ‘climb down to the bottom’
- Use of number rods to begin introducing bar model and part/whole approach.



- Use of cherry model to support confidence with what a number is and partitioning.



- Use language of whole and parts.

The ability to calculate mentally forms the basis of all methods of calculation and has to be maintained and refined. A good knowledge of numbers or a ‘feel’ for numbers is the product of structured practice through progression in relevant practical maths experiences, visual representations and repetition. It requires an understanding of number patterns and relationships developed through directed enquiry, use of models and images and the application of acquired number knowledge and skills. Children need to be able to apply their knowledge of number facts to larger calculations with an understanding of the multiplicative process of place value eg 2+3, 20+30, 0.2+0.3

Secure mental calculation requires the ability to:

- recall key number facts instantly – for example, all addition and subtraction facts for each number to at least 10 then 20 by the end of Year 1. By the end of Year 2 children should be able to fluently recall sums and differences of multiples of 10. By the end of Year 3 children should add and subtract ones, tens and one hundreds to a three digit number. By the end of Year 4 children will be able to recall multiplication and division facts up to 12 × 12. By the end of Year 5 children will be expected to add and subtract numbers mentally with increasingly larger numbers. By the end of Year 6 children should be able to perform mental calculations, including mixed operations and larger numbers.
- Throughout KS1 and 2 children should be able to use doubling and halving efficiently for calculation. Instant recall of near doubles addition and subtraction facts to 20 supports calculation with increasingly larger numbers.
- use taught strategies to work out the calculation – for example, recognise that addition can be done in any order and use this to add mentally a one digit number or a multiple of 10 to a one-digit or two-digit number (Year 1), partition two-digit numbers in different ways including into multiples of ten and one and add the tens and ones separately and then recombine (Year 2).
- understand how the rules and laws of arithmetic are used and applied – for example, to add or subtract mentally combinations of one-digit and two-digit numbers (Year 3), and to calculate mentally with whole numbers, fractions, percentages and decimals (Year 6).
- round and adjust numbers to help mental calculation and be able to estimate using their 'feel' for numbers e.g. 397-49
- depth in the recall of number facts is planned for. (Missing number problems and variation are part of calculation strategies used)

By the end of Year 6, children will be equipped with efficient mental and written calculation methods, which they use with fluency. Decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. At whatever stage in their learning, and whatever method is being used, children's strategies must still be underpinned by a secure depth, understanding and knowledge of number facts that can be recalled fluently.

The overall aims are that when children leave primary school they:

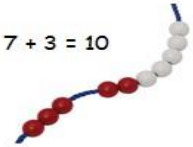
- Are able to recall number facts with fluency, having developed conceptual understanding through being able to visualise key ideas – such as those related to place value - through experience with practical equipment and visual representations;
- Make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads. Use of cherry model, bar model and number lines will support this.
- Have an efficient, reliable, written method of calculation for each number operation that they can apply with confidence when undertaking calculations that they cannot carry out mentally;
- Are able to make connections between all four number operations, understanding how they relate to one another, as well as how the rules and laws of arithmetic can be applied.

Addition:

Mental Calculation Strategies for Addition and Subtraction

Number Bonds

7 + 3 = 10

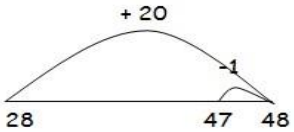


Doubles

Near Doubles

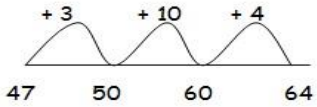
Adjusting

28 + 19 = 47



Bridging

47 + 17 = 64



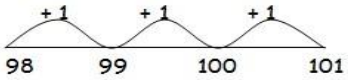
Partitioning

44 + 34 = 78

70 + 8 = 78

Finding the Difference

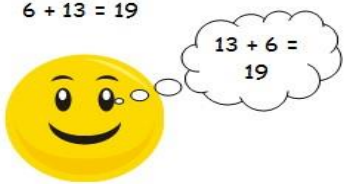
101 - 98 = 3



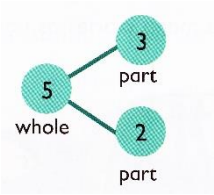
Reordering

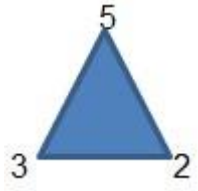
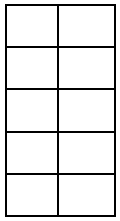
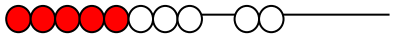
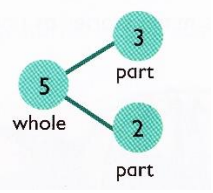
e.g. put big number in head when counting on

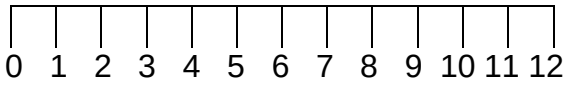
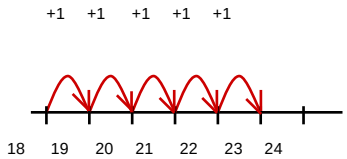
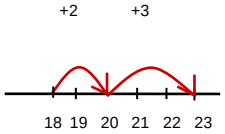
6 + 13 = 19

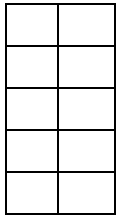
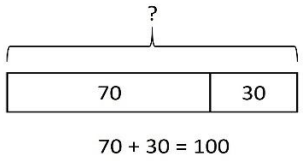
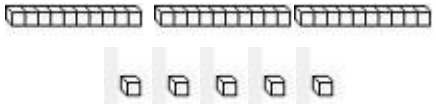
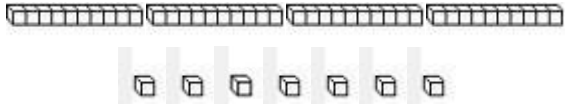
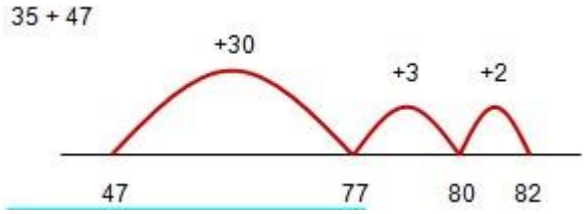


Whole and Parts

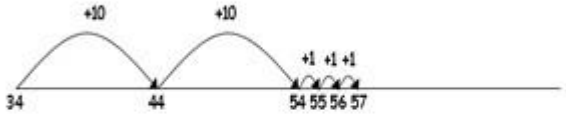
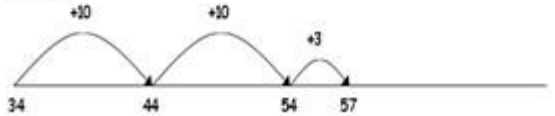
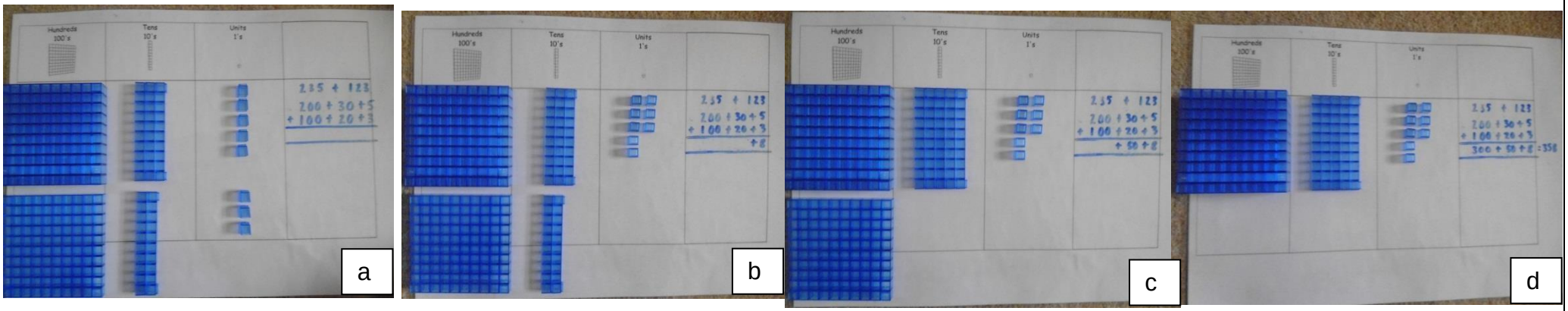


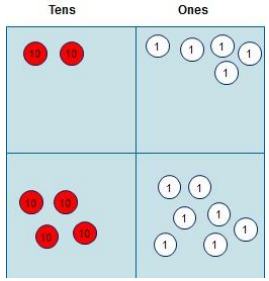
	Counting	Mental maths strategies	Rapid recall	Written calculation and appropriate models and images to support conceptual understanding	
Stage 1:	Count in ones to and across 100 forwards and backwards starting from 0, 1 and other numbers. Count in multiples of two, five and ten.	Pupils use apparatus to explore addition as the inverse of subtraction. .   4 add 1 is 5 5 subtract 4 leaves 1	Rapid recall of all pairs of numbers totalling numbers up to 20. Use structured apparatus – i.e. Numicon, tens frames, abaci, etc. 	**Combining two groups:** • Children develop a mental picture of the number system for use with calculation. A range of key models and images support this, alongside practical equipment. • Teachers model use of number tracks to count on or line up counters/objects along the number track. This is a precursor to use of a fully numbered number-line.	  3 + 2 = 5  ‘eight add two more makes ten’  ‘one more than four is five’ 

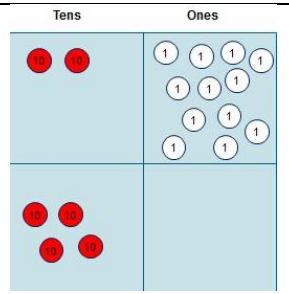
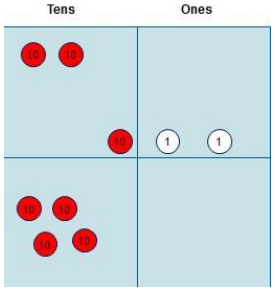
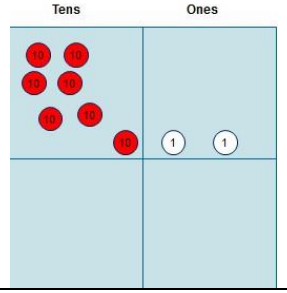
Stage 2:	Continue practicing above skills. Count in steps of 2, 3 and 5 forwards and backwards to and from zero. Count in tens from any number – link to coins in a piggy bank as well as a number square.	Reorder numbers when adding, i.e. start with largest number, find bonds, etc. Add doubles and derive near doubles. Round numbers to the nearest 10.	Recall addition facts for all numbers to 20.	**Counting on from any number:** • Children begin to use numbered lines to support their own calculations, initially counting in ones before beginning to work more efficiently. **Counting on from the largest number:** • Children reorder calculations to start with the largest number.	Number line with all numbers labelled  18 + 5  …to…   Use of questions such as: ‘How might I rearrange these to find the total?’

Stage 3:	Continue practicing above skills. Count from 0 in multiples of 4, 8, 50 and 100. Count on by 10 or 100 from any two digit number. Link to counting stick: counting forwards and backwards flexibly. Count up and down in tenths – linking to visual image.	Partitioning by bridging through 10 and multiples of 10 when adding. Adjusting when adding 11 or 9 to a number. Relating inverse number operations – using structured apparatus to explore and understand that subtraction undoes addition.	Connect pairs totalling ten to pairs of multiples of 10 totalling 100.  Use 10ps in tens frame. Recall pairs of two-digit numbers with a total of 100, i.e. 32 + ? = 100.	**Expanded horizontal addition:** • Add numbers using structured apparatus to support understanding of place value. • Make connections between partitioning both numbers using structured apparatus and partition the second number only using a number line.	 70 + 30 = 100 Add…  …and…  By partitioning and recombining 30+ 40 = 70 5 + 7 = 12 70 + 12 = 82 

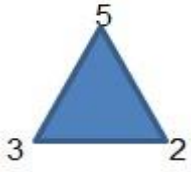
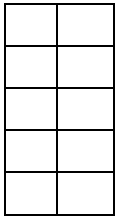
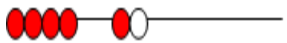
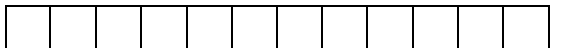
Stage 4:	Continue practicing previous skills. Count forwards and backwards from 0 in multiples of 6, 7, 9, 25 and 1000 using counting sticks, number lines, number squares, etc. Count up and down in tenths, hundredths and simple fractions using models and images, i.e. Dienes equipment, counting stick, ITPs.	Bridging through 60 for time, i.e. 70 minutes = 1 hour and 10 minutes. Rounding any number to the nearest 10, 100 or 1000. Rounding numbers with one decimal place to nearest whole number. Explore inverse as a way to derive new facts and to check accuracy of answers.	3/100 = 11/100.' Sums and differences of pairs of multiples of 10, 100 or 1000. Addition doubles of numbers to 100. Pairs of fractions totalling 1.	**Expanded horizontal method, leading to columnar addition:** • Written recording should follow teacher modelling around the size of numbers and place value using a variety of concrete materials, e.g. straws, Numicon, Dienes and place-value cards. • Teachers model how numbers can be partitioned into tens and ones, as well as in different ways, e.g. 20 + 5 10 + 15 • As children move towards using a columnar method, links continue to be made with earlier models and images, including the number line.	It is crucial that empty number lines are kept as well as using more formal written calculation methods.

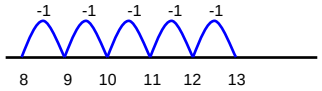
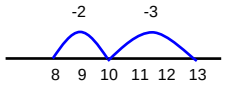
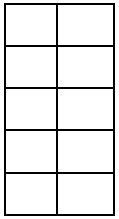
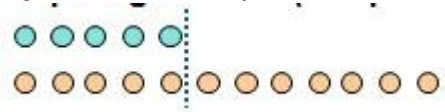
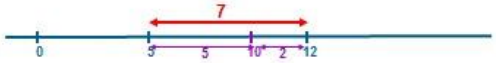
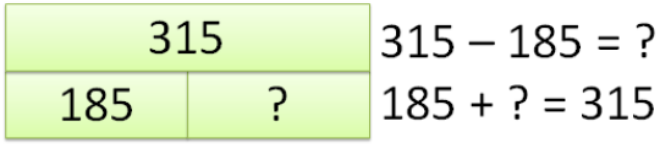
					Counting on in tens and ones to solve an addition calculation: 34 + 23 = 57  Counting on more efficiently: 34 + 23 = 57 
Illustration of how to use Dienes equipment to ensure children have an understanding of place value when using columnar addition.  					
Stage 5:	Count forwards and backwards in steps of powers of 10 for any given number up to one million.	Use apparatus and knowledge of place value to add decimals, i.e. 3.8 + 2.5 = 5 + 1.3 Reorder	Continue to practice previous stage and make links between known facts and addition	**Expanded vertical method, leading to columnar addition:** • Teachers model a column method that records and explains partial mental methods. • There remains an emphasis on the language of calculation, e.g. 'Seven add six equals thirteen.'	Informal columnar: Adding the ones/units first: 47 + 76 13 110 123

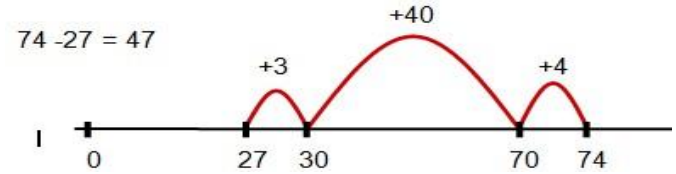
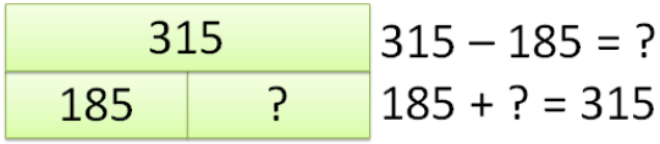
	Continue to count forwards and backwards in simple fractions. Count forward and backwards in appropriate decimals and percentages.	increasingly complex calculations, i.e. 1.7 + 2.8 + 0.3 = 1.7 + 0.3 + 2.8 Compensating – i.e. 405 + 399 → add 400 and then subtract 1.	pairs for fractions, percentages and decimals Doubles and halves of decimals, i.e. half of 5.6, double 3.4. Sums and differences of decimals, i.e. 6.5 + 2.7	‘Forty plus seventy equals onehundred and ten.’… …before recombining numbers. Teachers also model the language of: ‘Four tens add seven tens total eleven tens or 110.’ • Teachers similarly advance to model the addition of two 3-digit numbers with the expectation that as children’s knowledge of place value is secured, they become ready to approach a formal compact method.	
Stage 6:	Continue to practice previous skills. Count forwards and backwards in simple fractions, decimals and percentages.	Bridging through decimals, i.e. 0.8 + 0.35 = 0.8 + 0.2 + 0.15 using empty number lines. Partitioning using near doubles, i.e. 2.5 + 2.6 = 5 + 0.1 Reorder decimals, i.e. 4.7 + 5.6 – 0.7 …as… 4.7 – 0.7 + 5.6 = 4 + 5.6.	Ensure all children are confident recalling basic facts to 20 and deriving facts using place value. Make links between decimals, fractions and percentages.	**Columnar addition (formal written method):** • The concept of exchange is introduced through continued use of practical equipment (manipulatives). • Teachers model: 1. “I have two tens and five ones, which need adding to four tens and seven ones.” 2. “I add five ones to seven ones, which gives me twelve ones.” 3. “I exchange ten of my twelve ones for a ten counter.” 4. “I add my three tens and four tens to make seven tens.” “Altogether, I have seven tens and two ones.” • Teachers similarly advance to model the addition of two 3-digit	**Pupils to be encouraged to consider mental strategies first.** Formal columnar: 25 +47  25 +47 2 1 

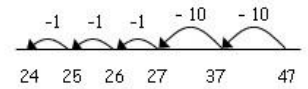
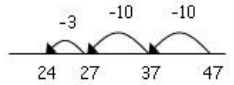
				numbers, e.g. 587 + 475 1062 1 1	 25 +47 2 1  25 +47 72 1 

Subtraction:

	Counting	Mental strategies	Rapid Recall	Written calculation and appropriate models and images to support conceptual understanding	
Stage 1:	Count in ones to and across 100, forwards and backwards starting from 0, 1 and other numbers. Count in multiples of two, five and ten.	Pupils use apparatus to explore addition as the inverse of subtraction: .   'four add one is five.' 'five subtract four leaves one'	Rapid recall of subtraction facts for numbers up to 10. Use structured apparatus, i.e. Numicon, tens frames, abaci etc. 	**Subtraction as taking away from a group:** • Children develop a mental picture of the number system for use with calculation. A range of key models and images support this, alongside practical equipment. Teachers model use of number tracks to count back or remove counters/objects from the number track or set. This is a precursor to use of a fully numbered number-line.	  5 - 2 =3  'six take away two leaves four'  'one less than six is five'
Stage 2:	Continue practicing above skills. Count in steps of 2, 3 and 5, forwards and	Bridging through two digit numbers, i.e. 24 – 19 = 19 + 1 + 4 using number lines. Subtracting 11 by subtracting 10	Recall subtraction (and addition) facts for all numbers to 20.	**Subtracting by counting back and on:** Children begin to use numbered lines to support their own calculations, initially counting back in	Number line with all numbers labelled 

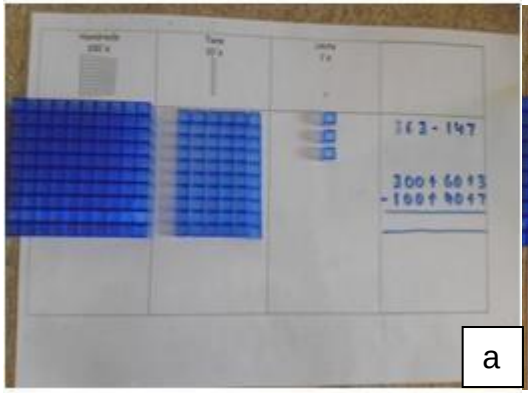
	backwards to and from zero. Count in tens from any number – link to coins in a piggy bank as well as a number square.	and then 1 more. Move to subtracting 9 by subtracting 10 and adding 1 using apparatus.		ones before beginning to work more efficiently.	13 – 5 = 8  13 – 5 = 8 
Stage 3:	Continue practicing above skills. Count from 0 in multiples of 4, 8, 50 and 100. Count on and back by 10 or 100 from any two digit number. Link to counting stick counting forwards and backwards flexibly. Count up and down in tenths – linking to visual image.	Partitioning by bridging through 10 and multiples of 10 when subtracting. Continue to practice adjusting when subtracting 11 or 9 from a number. Relating inverse number operations – use structured apparatus to explore and understand that subtraction undoes addition.	Connect subtractions from ten to subtractions from multiples of 10 totalling 100.  Use 10ps in tens frame. Subtract two digit numbers from 100 i.e. ? = 100 - 78	**Finding the difference:** • Teachers model how to find the difference when two numbers are relatively 'close together.' • Initially children compare two sets before moving on to a number line comparison. • **Pupils are taught to choose whether to count on or back** depending on which is more efficient.	Comparing two sets: comparison or difference.  Finding the difference on a number line.  Note: Finding the difference is often the most efficient way of solving a subtraction problem, e.g. 61 – 59 2,003 – 1,997 Bar model to support finding the difference and solving subtraction problems 

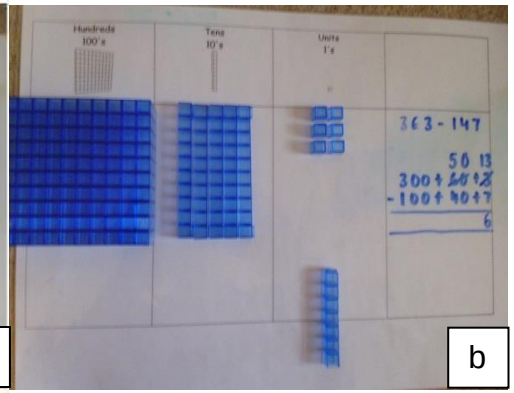
Stage 4:	Continue practicing of previous skills. Count forwards and backwards from 0 in multiples of 6, 7, 9, 25 and 1000 using counting sticks, number lines, number squares, etc. Count up and down in tenths, hundredths and simple fractions using models and images, i.e. Dienes equipment, counting stick, ITPs.	Bridging through 60 for time, i.e. 70 minutes = 1 hour and 10 minutes Rounding any number to the nearest 10, 100 or 1000. Rounding numbers with one decimal place to nearest whole number. Explore inverse as a way to derive new facts and to check accuracy of answers.	As above. Use known facts and place value to derive new ones, i.e. 'If I know 11 - 3 = 8, I also know 1.1 - 0.3 = 0.8 and 8/100 - 3/100 = 5/100.' Sums and differences of pairs of multiples of 10, 100 or 1000. Subtraction of fractions totalling 1, i.e. 1 – 0.3 = 0.7	**Subtracting TU – U and TU – TU:**	Use empty number lines to find the difference by bridging through multiples of ten.  Subtract by starting with the first number and partitioning the second, i.e. 74 - 27 74 – 20 = 54 54 – 4 = 50 50 – 3 = 47 Bar model to support finding the difference and solving subtraction problems 
Stage 5:	Count forwards and backwards in steps of powers of 10 for any given number up to one million.	Use apparatus and knowledge of place value to subtract decimals, i.e. 3.8 – 2.5 = 1.3 Reorder increasingly complex calculations,	Continue to practice previous stage and make links between known facts and addition	**First stage of column method, including expanded method:** • Written recording should follow teacher modelling around the size of numbers and place	Children should continue to use empty number lines and use more formal written methods when numbers become too big or complex.

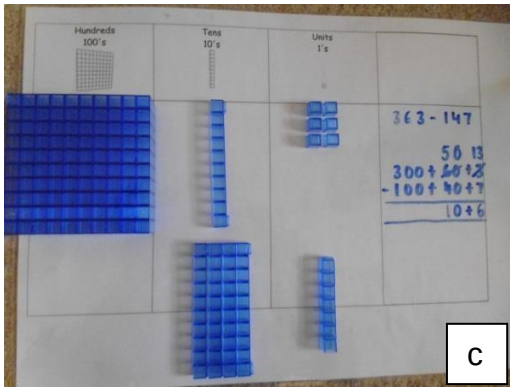
	Continue to count forwards and backwards in simple fractions. Count forwards and backwards in appropriate decimals and percentages.	i.e. 1.7 – 5 – 0.7 = 1.7 – 0.7 – 5. Compensating – i.e. 405 – 399 → subtract 400 and then add 1.	pairs for fractions, percentages and decimals. Doubles and halves of decimals, i.e. half of 5.6, double 3.4. Sums and differences of decimals, i.e. 6.5 + 2.7	value using a variety of concrete materials, e.g. straws, Numicon, Dienes and place-value cards.	Counting back in tens and ones to solve an addition calculation: 47 – 23 = 24  Counting back more efficiently: 47 – 23 = 24 

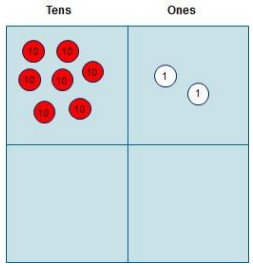
363 – 147 = 216
50 13
300 + 60 + 3
100 + 40 + 7
200 + 10 + 6 = 216

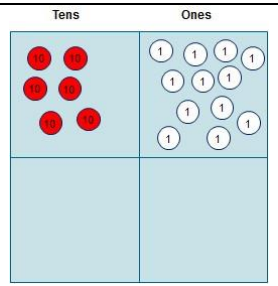
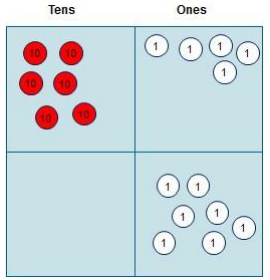
Illustration of how to use Dienes equipment to ensure children understand transference of numbers when using columnar subtraction.



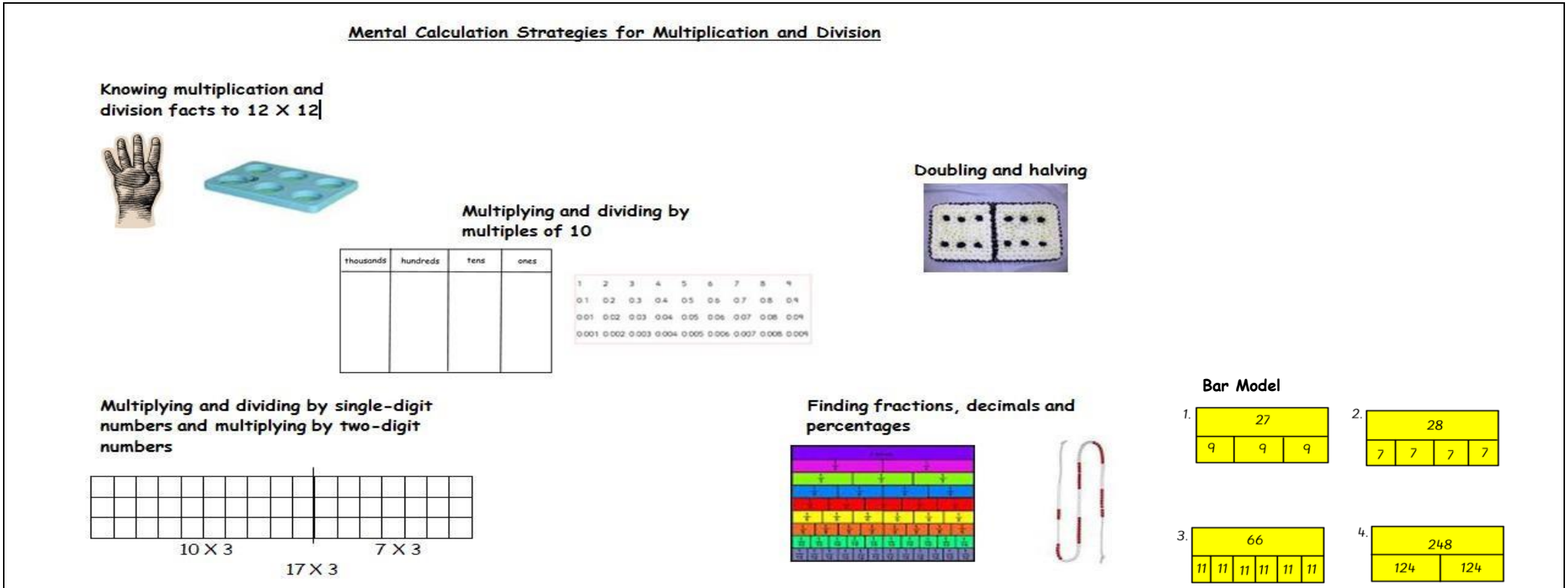


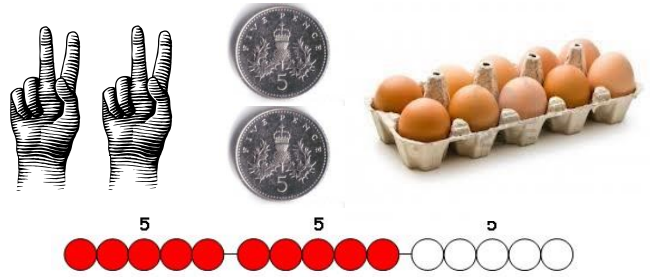


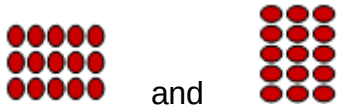
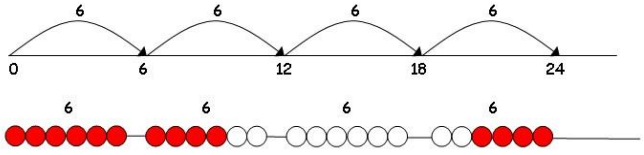
Stage 6:	Continue to practice previous skills. Count forwards and backwards in simple fractions, decimals and percentages.	Bridging through decimals, i.e. 1.5 – 0.8 = 1.5 – 0.5 then 0.3 using empty number line.	Ensure all children are confident recalling basic facts to 20 and deriving using place value. Make links between decimals, fractions and percentages.	**Second stage of column method:** • The concept of exchange is introduced through continued use of practical equipment (manipulatives). • Teachers model: 1. "I have seven tens and two ones. I need to subtract four tens and seven ones." 2. "At the moment, I cannot subtract seven ones from two ones, so I need to transfer one ten to become ten ones." 3. "Now I can take away seven ones from twelve ones, so that I have five ones left. 4. "I can now subtract four tens from six tens, which leaves me with two tens."	Formal columnar: 7 2 - 4 7  6 1 7 2 - 4 7

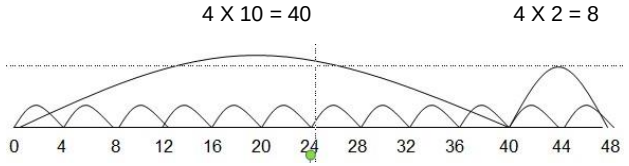
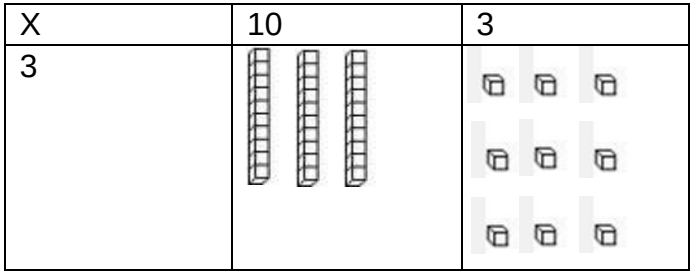
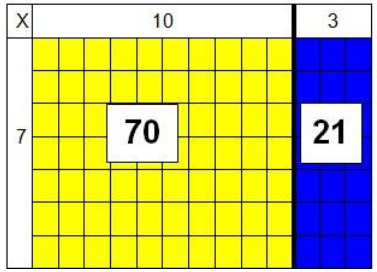
				5. “I recombine two tens and fives ones to understand that I am left with twenty-five.” • Teachers similarly advance to model the subtraction of one 3-digit number from another, e.g. 5 1 5 6 3 - 2 4 6 3 1 7	  

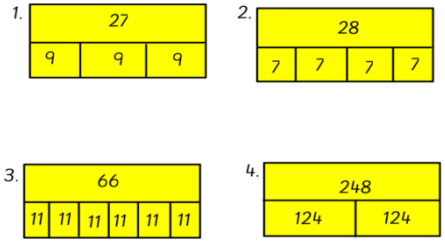
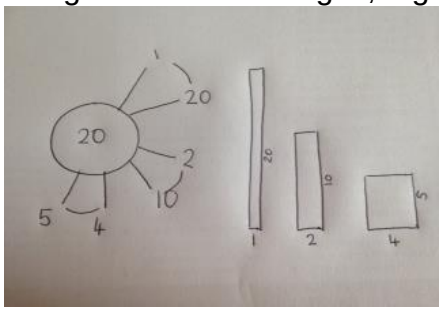
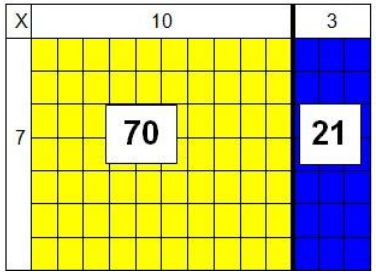
Multiplication:

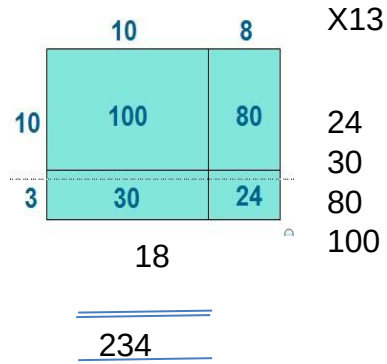
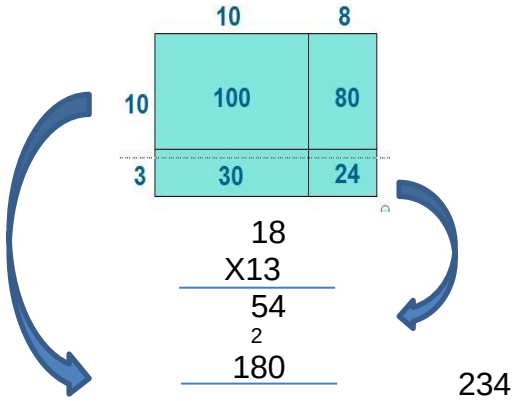


	Counting	Mental strategies	Rapid recall	Written calculation and appropriate models and images to support conceptual understanding	
Stage 1:	Count forwards and backwards in 2s, 5s and 10s	Doubling up to six and then ten whilst using related models and images.	Derive/recall doubles up to five and derive/recall halves up to ten. Recall odd and even numbers to	**Developing early conceptual understanding of multiplication:**	Use objects, pictorial representations and arrays to show the concept of multiplication: 

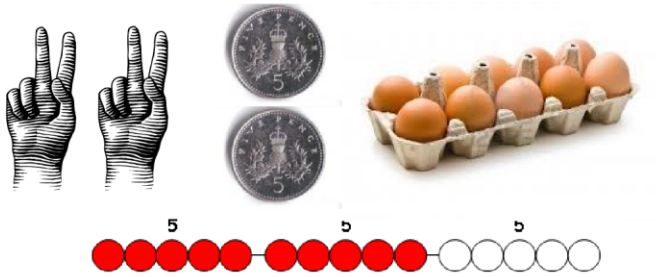
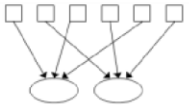
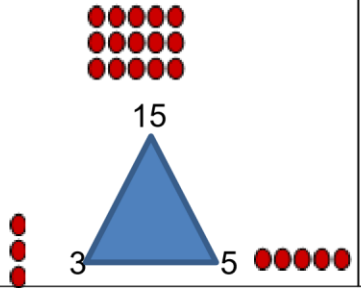
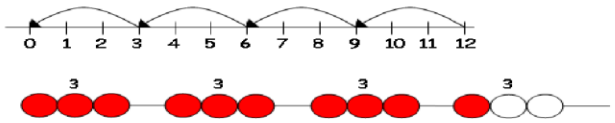
			10 in reference to structured apparatus. 		
Stage 2:	Count forwards and backwards in 2s, 3s, 5s and 10s from zero.	Begin to understand and use inverse number operations:  Stories are used alongside a triad to help children understand links between number operations, e.g. “There are five pencils in two packs, which means that there are ten pencils altogether.”	Derive/recall doubles up to ten and derive/recall halves up to twenty. Recall odd and even numbers to 20 in reference to structured apparatus. Recall & use multiplication facts for the 2X, 5X and 10X-tables.	**Understanding multiplication as repeated addition:** • Investigate multiplication as repeated addition, so that the law of cummutativity is understood. • Whilst arrays are also modelled explicitly at this stage, it is important to note that they will continue to be a key model at later stages, alongside more formal methods of calculation.	Arrays: 5 X 3 3 X 5  and Number lines: 6 X 4 = 24  So: ‘Six taken four times”

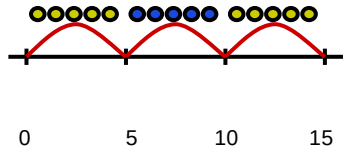
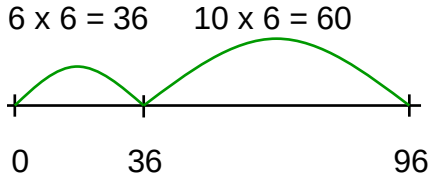
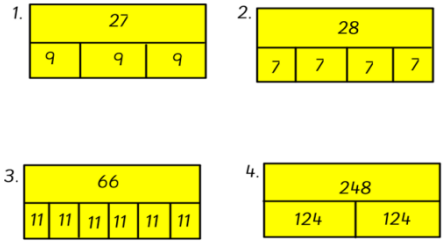
Stage 3:	Counting forwards and backwards in 2s, 3s, 4s, 5s, 8s and 10s from zero. Count up and down in tenths.	Use doubling to make connections between the 2X, 4X and 8X-tables. Understand that multiplication can be undertaken by partitioning numbers, e.g. 12 X 4 = 10 X 4 + 2 X 4 Introduce the structure of scaling: e.g. Find a ribbon that is 4 times as long as the blue ribbon  2cm 8cm	Recall odd and even numbers to 100 in reference to structured apparatus. Recall and use multiplication facts for the 2X, 3X, 4X, 5X, 8X and 10X tables.	**Relate multiplying a 2-digit by 1-digit number using repeated addition and arrays to represent:**	Children use an empty number line to chunk efficiently: 4 X 12 = 48  3 X 13 = 39  7 X 13 = 91 

					Use bar model to visualise multiplication number sentences 
Stage 4:	Counting forwards and backwards in 2s, 3s, 4s, 5s, 7s, 8s, 10s, 25s and 1000s from zero. Count up and down in tenths and hundredths.	Derive factor pairs of numbers using models and images, e.g.  Know what happens when a number is multiplied by zero or one. Use reordering to multiply three numbers.	Recall & use multiplication facts for all times-tables up to 12 X 12.	**Relate multiplying a 3/2-digit by 1digit number with arrays towards using long/short multiplication:**	Relate multiplying a 3/2-digit by 1-digit number, now also setting it out as short multiplication.  7 X 13 = 91 7 X 10 = 70 7 X 3 = 21 = 91 At this stage, the **non-statutory** guidance in the national curriculum suggests teaching short multiplication; however, the team feel that an expanded form of calculation (as set out above) is be a better lead into long/short multiplication.

Stage 5:	Counting forwards and backwards in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 25s and 1000s from zero.	Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.	Recall & use multiplication facts for all times-tables up to 12 X 12.	**Relate multiplying a 4/3/2-digit by 1/2digit number with grid to using long multiplication:**	
Stage 6:	Consolidate all previous counting, including forwards and backwards in fractions.	Perform mental calculations, including with mixed numbers and operations.	Recall & use multiplication facts for all times-tables up to 12 X 12. In addition, use facts confidently to make larger calculations.	**Relate multiplying a 4/3/2-digit by 1/2digit number with grid to using short multiplication:**	

Division:

	Counting	Mental strategies	Rapid recall	Written calculation and appropriate models and images to support conceptual understanding	
Stage 1:	Count forwards and backwards in 2s, 5s and 10s	Doubling up to six and then ten whilst using related models and images.	Derive/recall doubles up to five and derive/recall halves up to ten. Recall odd and even numbers to 10 in reference to structured apparatus. 	**Developing early conceptual understanding of division as grouping and sharing:**	Use objects, pictorial representations and arrays to show the concept of division as grouping and sharing.  "Two children share six pencils between them"  "Six children are asked to get into three equal groups" 
Stage 2:	Count forwards and backwards in 2s, 3s, 5s and 10s from zero.	Begin to understand and use inverse number operations. 	Derive/recall doubles up to ten and derive/recall halves up to twenty. Recall odd and even numbers to 20 in	**Understanding division as repeated subtraction:** • Investigate division as repeated subtraction. • Through teacher modelling,	Number lines and arrays: 12 ÷ 3 = 4 

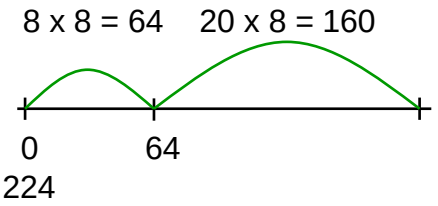
		Stories are used alongside a triad to help children understand links between number operations, e.g. “15 children are asked to get into three groups and find out that there are five people in each group.”	reference to structured apparatus. Recall and use multiplication facts for the 2X, 5X and 10X-tables.	children need to know that division is not commutative.	15 ÷ 5 = 3 
Stage 3:	Counting forwards and backwards in 2s, 3s, 4s, 5s, 8s and 10s from zero.	Use doubling to make connections between the 2X, 4X and 8X-tables. Understand that multiplication can be undertaken by partitioning numbers, e.g. 12 X 4 = 10 X 4 + 2 X 4 Introduce the structure of scaling: e.g. Find a ribbon that is 4 times as long as the blue ribbon.  2cm 8cm	Recall odd and even numbers to 100 in reference to structured apparatus. Recall & use multiplication facts for the 2X, 3X, 4X, 5X, 8X and 10X tables.	**Dividing a 2-digit by 1-digit number, representing this efficiently on a number line:**	Children use an empty number line to chunk efficiently. 96 ÷ 6 = 16  Use bar model to visualise division number sentences and problems 

<table>
<tr>
<td>Stage 4:</td>
<td>Counting forwards and backwards in 2s, 3s, 4s, 5s, 7s, 8s, 10s, 25s and 1000s from zero.</td>
<td>Derive factor pairs of numbers using models and images.

Know what happens when a number is multiplied by zero or one.

Use reordering to multiply three numbers.</td>
<td>Recall & use multiplication facts for all times-tables up to 12 X 12.</td>
<td>Dividing a 3/2-digit by 1-digit number, representing this efficiently on a number line, also in relation to long division:
• At this stage, no remainders are present unless in a practical context.</td>
<td>Children use an empty number line to chunk efficiently.

224 ÷ 8 = 28

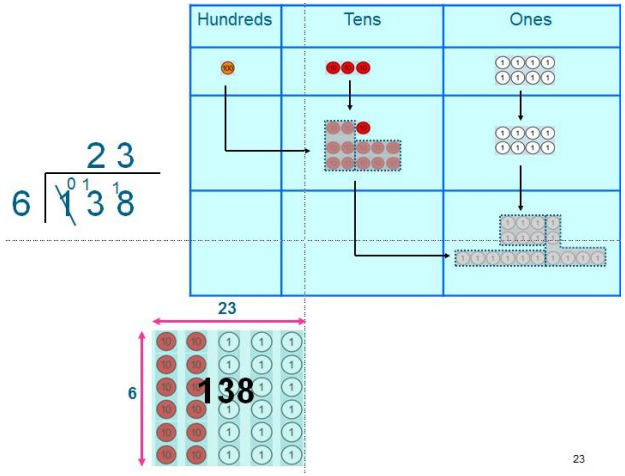
 

28
8 | 224
- 160 (8 X 20)
64
- 64 (8 X 8)
0

…or…

28
8 | 224
20 X 8 = 160
64
8 X 8 = 64
0</td>
</tr>
<tr>
<td>Stage 5:</td>
<td>Counting forwards and backwards in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 25s and 1000s from zero.</td>
<td>Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.</td>
<td>Recall & use multiplication facts for all times-tables up to 12 X 12.</td>
<td>Dividing a 4/3/2digit by 1-digit number, in relation to long division:
• By this stage, there is a statutory requirement that children can use a formal written calculation method, such as long division.
• Short division may begin to be taught alongside</td>
<td>As schools have autonomy to decide children’s progression in learning between long and short division in Years 5 and 6, the maths team suggest beginning with long division.

Remainders should be interpreted in the following ways when long division is used:
• as whole numbers
• as fractions
• as decimals
• through rounding in an appropriate way to the context</td>
</tr>
</table>

				long division, but still with use of visual • representations	
Stage 6:	Consolidate all previous counting, including forwards and backwards in fractions.	Perform mental calculations, including with mixed numbers and different number operations.	Recall & use multiplication facts for all times-tables up to 12 X 12. In addition, use facts confidently to make larger calculations.	**Dividing a 4/3/2digit by 2/1-digit number, in relation to long and then short division:** • By this stage, there is a statutory requirement that children can use formal written calculation methods, including long and short division. Use of visual representations – like the ones opposite – remain important.	Children's progression in learning between long and short division in Years 5 and 6, should move from long division to short division. Remainders could be interpreted in the following way when short division is used: • through rounding in an appropriate way to the context 

'Long division' (÷ by a 2 digit number) using the method for short division.

504 ÷ 36 =

Step 1: Note down the 'pattern' of the dividing number.

In this case, the 'pattern' of 36 is achieved by adding the multiple of 30 and multiple of 6.

30 + 6	**36**
60 + 12	**72**
90 + 18	**108**
120 + 24	**144**
150 + 30	**180**
180 + 36	**216**
210 + 42	**252**
240 + 48	**288**
270 + 54	**324**
300 + 60	**360**

Step 2: Complete the calculation using the formal method for short division.

$$\begin{array}{r} 0\ 1\ 4 \\ 36\overline{)\ 5\ {}^{5}0\ {}^{14}4} \end{array}$$

Pupils are encouraged to make jottings to ensure accurate regrouping of remainders. Example: