

Kew Riverside
Primary School
Calculation Policy

Aims: Here at Kew Riverside, we are enthusiastic, risk-taking mathematicians. Mathematics is a core subject of the National Curriculum and a tool for everyday life. It teaches children to make sense of the world around them through developing their ability to calculate, to reason and to problem solve.

At Kew Riverside, children develop skills, confidence and competence in mathematics. Through a shared ethos of passion and positivity, our children and staff cultivate a love of mathematics and a thirst for knowledge and challenge. Our classroom environments encourage exploration, questioning and mathematical talk as well as opportunities for children to develop and apply their ideas while making connections to the world around them.

By using a 'Maths Mastery Approach' and following the White Rose Primary Scheme of Learning, we ensure pupils develop deep understanding through small steps and opportunities to learn using concrete (manipulatives), pictorial and abstract (written) representations. Pupils who grasp concepts rapidly are challenged with rich and sophisticated problems, in order to prove depth of understanding, before any acceleration through new content. Those who are unable to prove fluency in a concept are given opportunities to consolidate and refine their understanding before moving on.

EYFS (taken from Early years foundation stage statutory framework 2025) Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding – such as using manipulatives, including small pebbles and tens frames for organising counting – children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.

Key Stage 1 (taken from the Mathematics Curriculum 2014) The principle focus of mathematics in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including with practical resources.

By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value.


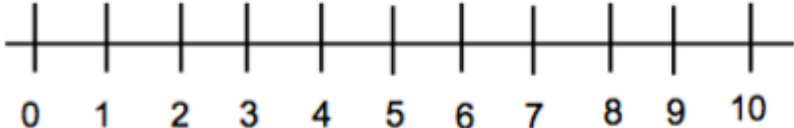


Lower Key Stage 2 (taken from the Mathematics Curriculum 2014) The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve problems, including with decimal place value. By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Upper Key Stage 2 (taken from the Mathematics Curriculum 2014) The principle focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

Problems will demand efficient written and mental methods of calculation. Pupils are introduced to the language of algebra. By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division.

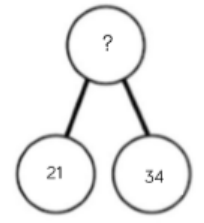
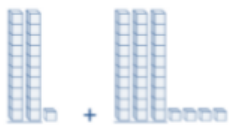
Progression in number lines

EYFS	Number track	Has the numbers inside the sections, rather than on the divisions	
End of EYFS and moving towards year 1 expectation	Calibrated, numbered numberline	Equal divisions marked on the numberline and each division is numbered	
Year 1 - National age related expectation	Calibrated, unnumbered numberline	Equal divisions are marked, but left unnumbered for children to add relevant numbers to	
Year 2 - National age related expectation	Blank numberline	No divisions or numbers marked for the children	

KS2- Don't underestimate the importance of number lines in KS2. If students understand how to manipulate number lines, they are more likely to succeed throughout KS2 by using number line strategies- especially with mental calculations. Always ask yourself- do you need columns (where simple calculation mistakes can be made) or would it be better on a number line?

	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	<p>Combining two parts to make a whole: part whole model.</p> <p>Starting at the bigger number and counting on- using cubes.</p> <p>Regrouping to make 10 using ten frame.</p>	<p>Adding three single digits.</p> <p>Use of base 10 to combine two numbers.</p>	<p>Column method- regrouping.</p> <p>Using place value counters (up to 3 digits).</p>	<p>Column method- regrouping.</p> <p>(up to 4 digits)</p>	<p>Column method- regrouping.</p> <p>Use of place value counters for adding decimals.</p>	<p>Column method- regrouping.</p> <p>Abstract methods.</p> <p>Place value counters to be used for adding decimal numbers.</p>

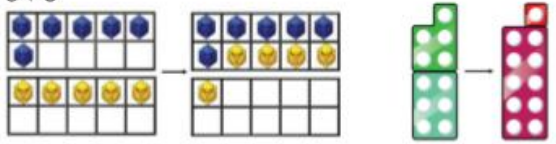
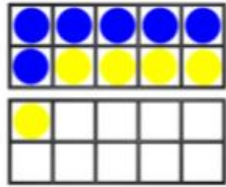
Conceptual variation; different ways to ask children to solve 21 + 34

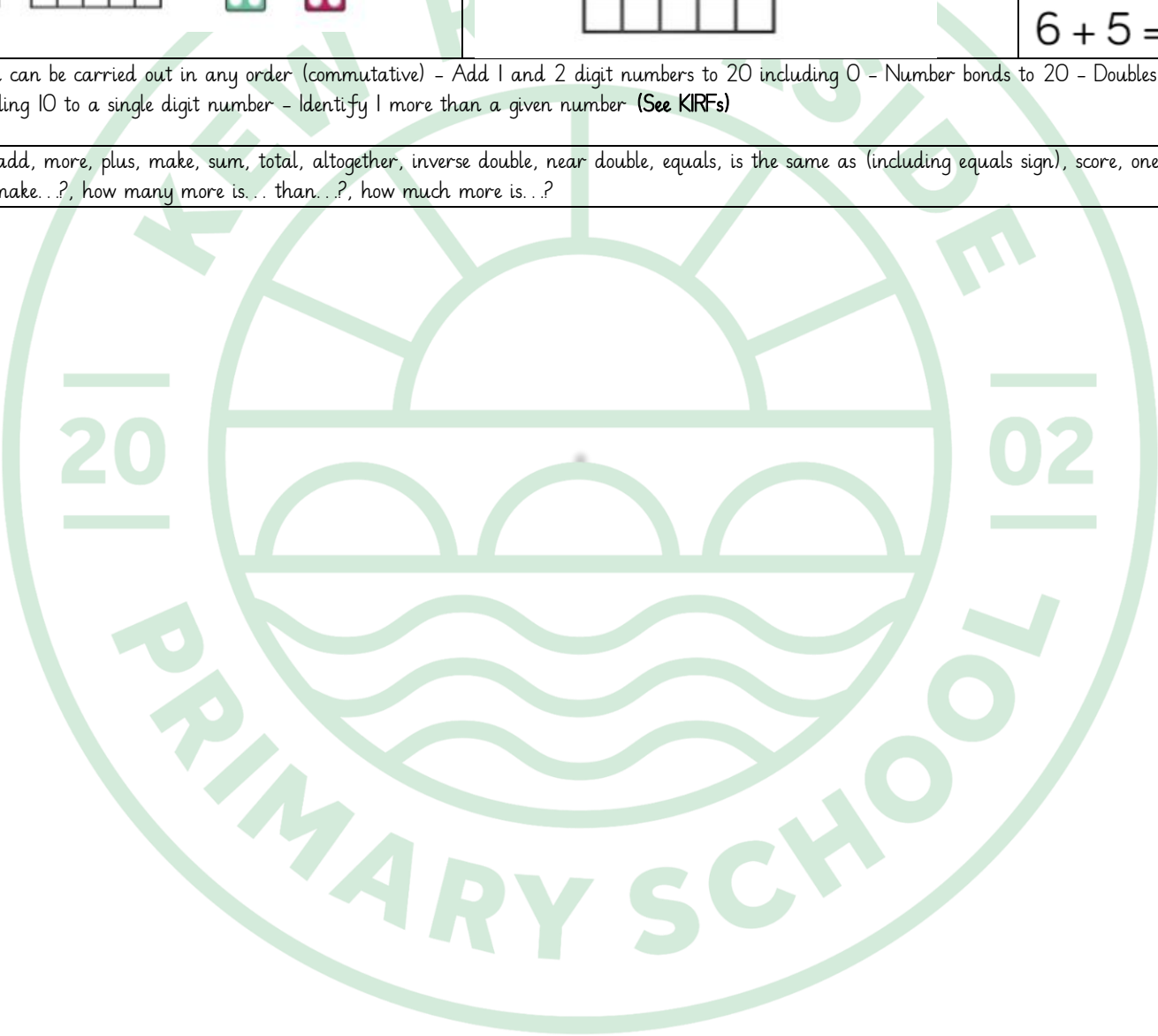
 <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="2" style="text-align: center;">?</td> </tr> <tr> <td style="text-align: center;">21</td> <td style="text-align: center;">34</td> </tr> </table>	?		21	34	<p>Word problems: In year 3, there are 21 children and in year 4, there are 34 children. How many children in total?</p> <p>$21 + 34 = 55$. Prove it</p>	$\begin{array}{r} 21 \\ +34 \\ \hline \end{array}$ <p>$21 + 34 =$</p> <div style="border: 1px dashed black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></div> $= 21 + 34$ <p>Calculate the sum of twenty-one and thirty-four.</p>	 <p>Missing digit problems:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="background-color: #f8d7da;">10s</th> <th style="background-color: #f8d7da;">1s</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">● ●</td> <td style="text-align: center;">●</td> </tr> <tr> <td style="text-align: center;">● ● ●</td> <td style="text-align: center;">?</td> </tr> <tr> <td style="text-align: center;">?</td> <td style="text-align: center;">5</td> </tr> </tbody> </table>	10s	1s	● ●	●	● ● ●	?	?	5
?															
21	34														
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EYFS/Year 1

Addition

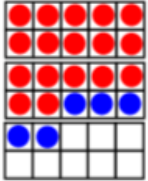
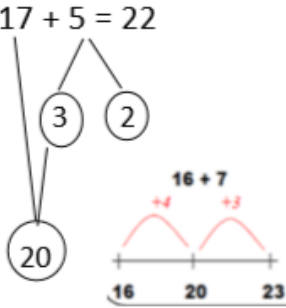
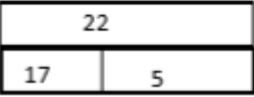

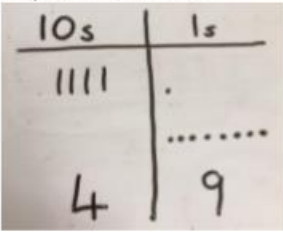
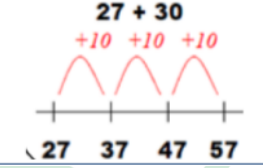
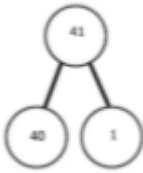
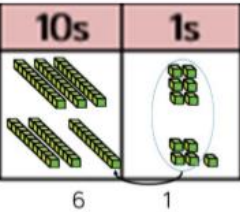
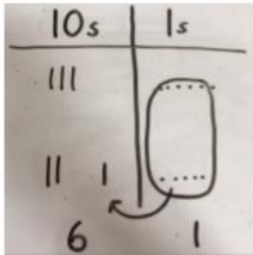
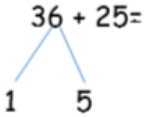
- read, write and interpret mathematical statements involving addition (+) and equals (=) signs - represent and use number bonds - add one-digit and two-digit numbers to 20, including zero - solve one-step problems that involve addition using concrete objects and pictorial representations, and missing number problems as seen below

<p>Regrouping to make 10 using ten frame.</p>	<p>Regrouping to make 10; using ten frames and counters/cubes or using Numicon. $6 + 5$</p> 	<p>Children to draw the ten frame and counters/cubes.</p> 	<p>Children to develop an understanding of equality e.g.</p> $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$
<p>Mental Calculations</p>	<p>- Know addition can be carried out in any order (commutative) - Add 1 and 2 digit numbers to 20 including 0 - Number bonds to 20 - Doubles of numbers up to and including double 10 - Adding 10 to a single digit number - Identify 1 more than a given number (See KIRFs)</p>		
<p>Vocabulary</p>	<p>number bonds, add, more, plus, make, sum, total, altogether, inverse double, near double, equals, is the same as (including equals sign), score, one more, two more... ten more, how many more to make...?, how many more is... than...?, how much more is...?</p>		



Addition

- Solve problems with addition: - using concrete objects and pictorial representations, - applying their increasing knowledge of mental and written methods - recall and use addition facts to 20 fluently, and derive and use related facts up to 100 - add and numbers using concrete objects, pictorial representations, and mentally, including: - a two-digit number and ones - a two-digit number and tens - two two-digit numbers - adding three one-digit numbers - show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot - recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

	Concrete	Pictorial	Abstract
Add a two digit number and ones	 <p>17 + 5 = 22 Use ten frame to make 'magic ten'</p> <p>Children explore the pattern. 17 + 5 = 22 27 + 5 = 32</p>	<p>Use part part whole and number line to model.</p> <p>17 + 5 = 22</p> 	<p>17 + 5 = 22</p> <p>Explore related facts</p> <p>17 + 5 = 22 5 + 17 = 22 22 - 17 = 5 22 - 5 = 17</p> 
Use of base 10 to combine two numbers.	<p>TO + O using base 10. Continue to develop understanding of partitioning and place value. 41 + 8</p> 	<p>Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.</p>  	<p>41 + 8</p>  <p>1 + 8 = 9 40 + 9 = 49</p>
Use of base 10 to combine two two-digit numbers.	<p>TO + TO using base 10. Continue to develop understanding of partitioning and place value. 36 + 25</p> 	<p>Children to represent the base 10 in a place value chart.</p> 	<p>Looking for ways to make 10.</p> <p>36 + 25 =</p>  <p>30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61</p>

Year 3

Addition

- add and subtract numbers mentally, including: - a three-digit number and ones - a three-digit number and tens - a three-digit number and hundreds - add and subtract numbers with up to three digits, using formal written methods of columnar addition - estimate the answer to a calculation and use inverse operations to check answers - solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

	Concrete	Pictorial	Abstract
Expanded column addition		$356 + 213 =$ $\begin{array}{r} 356 \longrightarrow 300 + 50 + 6 \\ + 213 \longrightarrow 200 + 10 + 3 \\ \hline 569 \longleftarrow 500 + 60 + 9 \end{array}$	$353 + 268 = 621$ $300 + 50 + 3$ $200 + 60 + 8$ $\hline 600 + 20 + 1 = 621$ <p style="text-align: center;">100 10</p>
Column method-regrouping. Using place value counters (up to 3 digits).	<p>Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.</p>	<p>Children to represent the counters in a place value chart, circling when they make an exchange.</p>	$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ 11 \end{array}$
Mental Strategies	<p>- Add numbers mentally, including: a three-digit number and a single digit number a 3-digit number and multiples of 10 a 3-digit number and multiples of 100 - Estimate the answer to a calculation and use inverse operations to check answers - Know number pairs that total 1000 (multiples of 100) - Calculate 10 or 100 more than any given number (See KIRFs)</p>		
Vocabulary	<p>add, increase, total, plus, sum, more, altogether, column addition, estimate, inverse, double, near double, one more, ten more... one hundred more, how many more to make ...? how many more is... than ...? how much more is...?, tens boundary, hundreds boundary</p>		

Year 4

Addition

- add numbers with up to 4 digits using the formal written methods of columnar addition and where appropriate - estimate and use inverse operations to check answers to a calculation - solve addition and solve two-step problems in contexts, deciding which operations and methods to use and why.

	Concrete	Pictorial	Abstract
Column method- regrouping. (up to 4 digits)	<p>Children continue to use dienes or pv counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.</p>	<p>Draw representations using pv grid.</p>	
Mental Strategies	- Add numbers mentally, including: a four digit number and multiples of one thousand - Use knowledge of doubles to derive related facts (e.g. $15 + 16 = 31$ because $15 + 15 = 30$ and $30 + 1 = 31$) - Know number pairs that total 1000 (multiples of 10) - Estimate the answer to a calculation and use inverse operations to check answers (See KIRFs)		
Vocabulary	add, addition, more, plus, increase, sum, total, altogether, score, double, near double, tens boundary, hundreds boundary, thousands boundary, inverse		

Year 5

Addition

- add whole numbers with more than 4 digits, including using formal written methods (columnar addition) - add numbers mentally with increasingly large numbers - use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy - solve multi-step problems in contexts, deciding which operations and methods to use and why

	Concrete	Pictorial	Abstract																				
<p>Column method-regrouping.</p> <p>Use of place value counters for adding decimals.</p>			<table border="1"> <thead> <tr> <th></th> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td>4</td> <td>3</td> <td>5</td> <td>6</td> </tr> <tr> <td>+</td> <td>2</td> <td>4</td> <td>3</td> <td>5</td> </tr> <tr> <td></td> <td>6</td> <td>7</td> <td>9</td> <td>1</td> </tr> </tbody> </table> <p style="text-align: center;">1</p> <p>Insert zeros for place holders.</p>		Th	H	T	O		4	3	5	6	+	2	4	3	5		6	7	9	1
	Th	H	T	O																			
	4	3	5	6																			
+	2	4	3	5																			
	6	7	9	1																			
Mental Strategies	<p>- Add numbers mentally with increasingly large numbers (e.g. $10,162 + 2,300 = 12,462$) - Mentally add tenths (e.g. $0.2 + 0.6 = 0.8$) and 1-digit whole numbers and tenths ($8 + 0.3 = 8.3$) - Use number bonds to 100 knowledge to calculate complements to one using hundredths (e.g. $0.83 + 0.17 = 1$) - Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy (See KIRFs)</p>																						
Vocabulary	<p>Efficient written method, add, addition, more, plus, increase, sum, total, altogether, score, tens boundary, hundreds boundary, thousands boundary, units boundary, tenths boundary, inverse</p>																						

Year 6

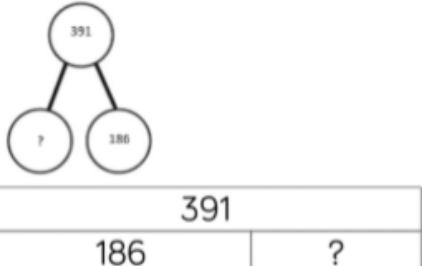
Addition

- solve multi-step problems in contexts, deciding which operations and methods to use and why - use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. Algebra - use simple formulae - express missing number problems algebraically - find pairs of numbers that satisfy an equation with two unknowns

	Concrete	Pictorial	Abstract
<p>Column method-regrouping.</p> <p>Abstract methods.</p> <p>Place value counters to be used for adding decimal numbers</p>			<p>$23.361 + 9.08 + 59.77 + 1.3 = 93.511$</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>Zero used as a place value holder.</p> </div>
Negative numbers			$-4 + 6 =$
Mental Strategies	<p>- Add numbers mentally with increasingly large numbers (e.g. $10,162 + 2,300 = 12,462$) - Add decimal numbers mentally (up to 2 decimal places) - Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. (See KIRFs)</p>		
Vocabulary	<p>order of operations, column addition, add, in total, answer, tens boundary, hundreds boundary, thousands boundary, millions boundary, units boundary, tenths boundary, hundredths boundary, decimal place, inverse</p>		

	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Subtraction	Taking away ones Counting back Find the difference Part whole model Make 10 using the ten frame	Counting back Find the difference Part whole model Make 10 Use of base 10	Column method with regrouping. (up to 3 digits using place value counters)	Column method with regrouping. (up to 4 digits)	Column method with regrouping. Abstract for whole numbers. Start with place value counters for decimals- with the same amount of decimal places.	Column method with regrouping. Abstract methods. Place value counters for decimals- with different amounts of decimal places.

Conceptual variation; different ways to ask children to solve $391 - 186$

	<p>Raj spent £391, Timmy spent £186. How much more did Raj spend?</p> <p>Calculate the difference between 391 and 186.</p>	<p>$\square = 391 - 186$</p> $\begin{array}{r} 391 \\ -186 \\ \hline \end{array}$ <p>What is 186 less than 391?</p>	<p>Missing digit calculations</p> $\begin{array}{r} 39\square \\ -\square\square6 \\ \hline \square05 \end{array}$
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EYFS/Year 1

Subtraction

- read, write and interpret mathematical statements involving subtraction (−) and equals (=) signs - represent and use number bonds and related subtraction facts within 20 - subtract one-digit and two-digit numbers to 20, including zero - solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = - 9$.

Concrete

Pictorial

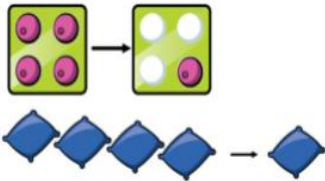
Abstract

Taking away ones

Counting back

Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used).

$$4 - 3 = 1$$

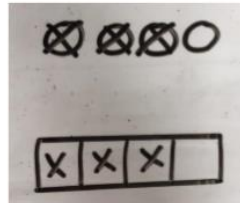


Counting back (using number lines or number tracks) children start with 6 and count back 2.

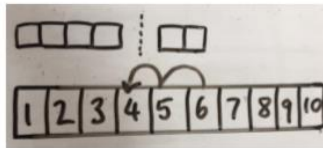
$$6 - 2 = 4$$



Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used.

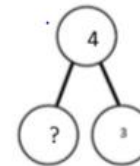


Children to represent what they see pictorially e.g.

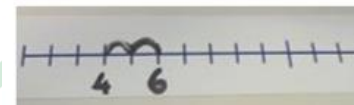
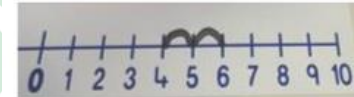


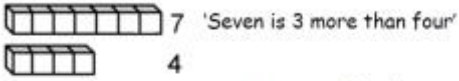
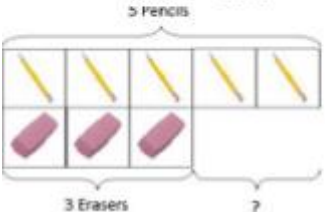
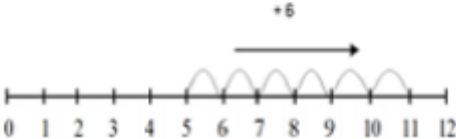
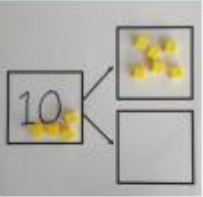
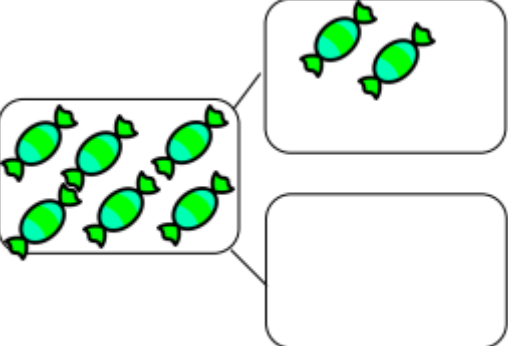


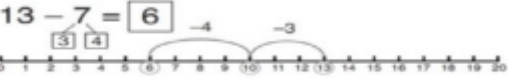
$$4 - 3 =$$



$$\square = 4 - 3$$

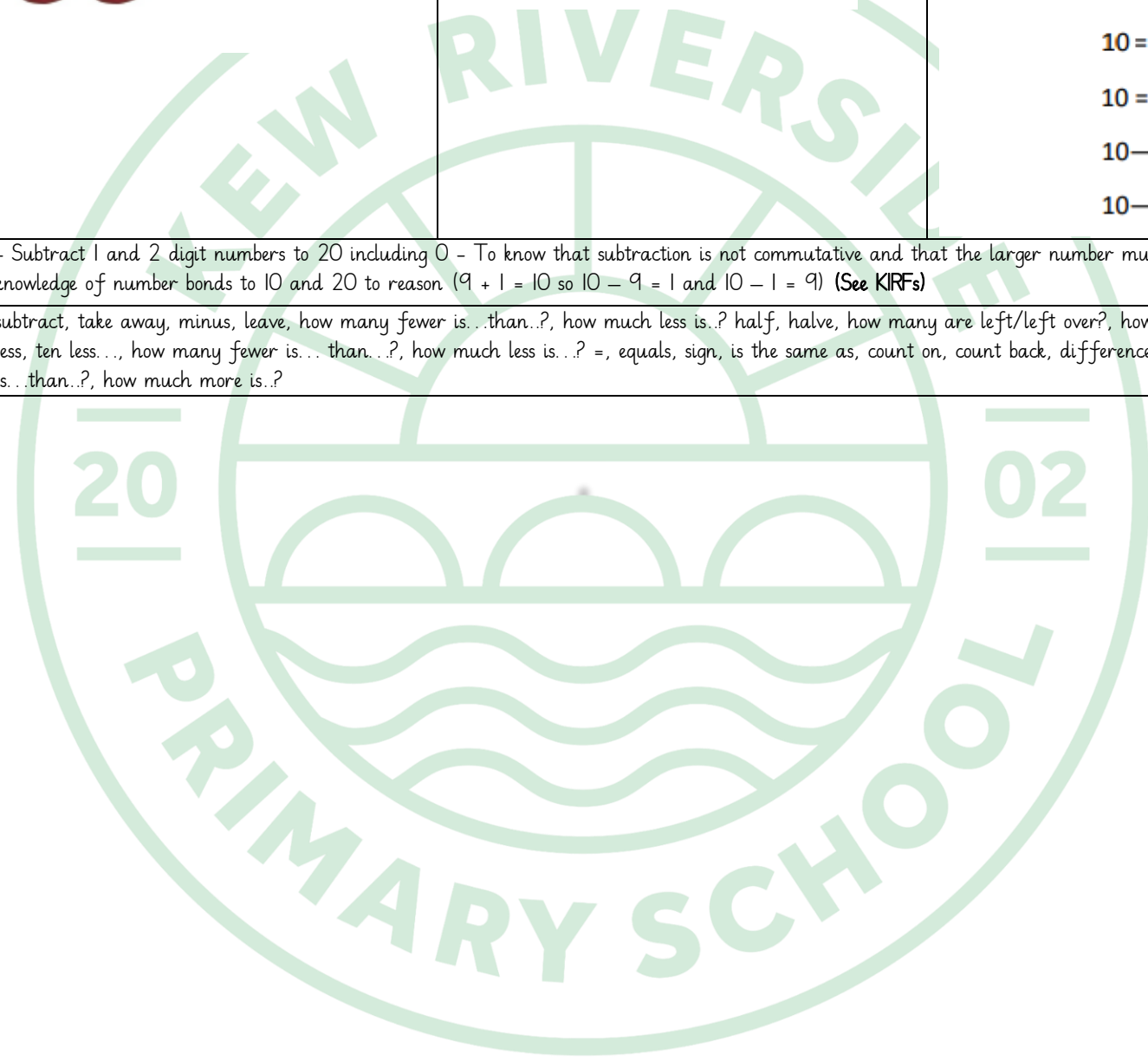


Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line



<p>Find the difference</p>	<p>Compare objects and amounts</p>  <p>'Seven is 3 more than four'</p> <p>4</p> <p>'I am 2 years older than my sister'</p>  <p>Lay objects to represent bar model.</p>	<p>Count on using a number line to find the difference.</p> 	<p>Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister.?</p>
<p>Represent and use number bonds and related subtraction facts within 20 Part Whole model</p>	 <p>Link to addition. Use PPW model to model the inverse.</p> <p>If 10 is the whole and 6 is one of the parts, what is the other part?</p> <p>$10 - 6 = 4$</p>	 <p>Use pictorial representations to show the part.</p>	<p>Move to using numbers within the part whole model.</p> 
<p>Make 10 using the ten frame</p>	<p>$14 - 9$</p>  <p>Make 14 on the ten frame. Take 4 away to make ten, then take one more away so that you have taken 5.</p>	<p>$13 - 7$</p>  <p>Jump back 3 first, then another 4. Use ten as the stopping point.</p>	<p>$16 - 8$</p> <p>How many do we take off first to get to 10? How many left to take off?</p>

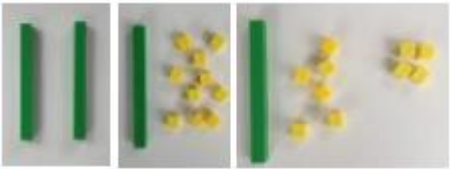



Bar Model			<table border="1" data-bbox="1536 164 2007 252"> <tr> <td data-bbox="1536 164 1912 252">8</td> <td data-bbox="1912 164 2007 252">2</td> </tr> </table> <p data-bbox="1711 320 1839 347">$10 = 8 + 2$</p> <p data-bbox="1711 384 1839 411">$10 = 2 + 8$</p> <p data-bbox="1711 448 1839 475">$10 - 2 = 8$</p> <p data-bbox="1711 512 1839 539">$10 - 8 = 2$</p>	8	2
8	2				
Mental Strategies	- Subtract 1 and 2 digit numbers to 20 including 0 - To know that subtraction is not commutative and that the larger number must always come first - Use knowledge of number bonds to 10 and 20 to reason ($9 + 1 = 10$ so $10 - 9 = 1$ and $10 - 1 = 9$) (See KIRFs)				
Vocabulary	subtract, take away, minus, leave, how many fewer is...than..?, how much less is..? half, halve, how many are left/left over?, how many are gone?, one less, two less, ten less... , how many fewer is... than...?, how much less is...? =, equals, sign, is the same as, count on, count back, difference between. how many more is...than..?, how much more is..?				



Year 2

Subtraction

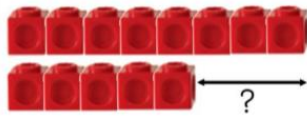
- solve problems with subtraction: - using concrete objects and pictorial representations, including those involving numbers, quantities and measures - applying their increasing knowledge of mental and written methods - recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100 - subtract numbers using concrete objects, pictorial representations, and mentally, including: - a two-digit number and ones - a two-digit number and tens - two two-digit numbers - show that subtraction has to be done in the order stated - recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

	Concrete	Pictorial	Abstract
Regroup a ten into ten ones	 <p>Use a PV chart to show how to change a ten into ten ones, use the term 'take and make'</p>	 $20 - 4 =$	$20 - 4 = 16$
Partitioning to subtract without regrouping. 'Friendly numbers'	$34 - 13 = 21$  <p>Use Dienes to show how to partition the number when subtracting without regrouping.</p>	<p>Children draw representations of Dienes and cross off.</p>  $43 - 21 = 22$	$43 - 21 = 22$

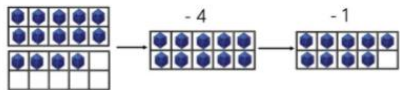
Find the difference

Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used).

Calculate the difference between 8 and 5.



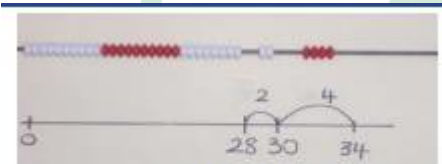
Making 10 using ten frames.
 $14 - 5$



Use of base 10

Make 10

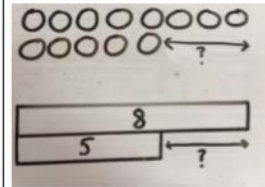
Progression should be crossing one ten, crossing more than one ten, crossing the hundreds.



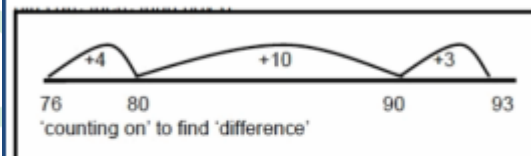
$$34 - 28$$

Use a bead bar or bead strings to model counting to next ten and the rest.

Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.



Children to present the ten frame pictorially and discuss what they did to make 10.



Use a number line to count on to next ten and then the rest.

Find the difference between 8 and 5.

$8 - 5$, the difference is

Children to explore why
 $9 - 6 = 8 - 5 = 7 - 4$ have the same difference.

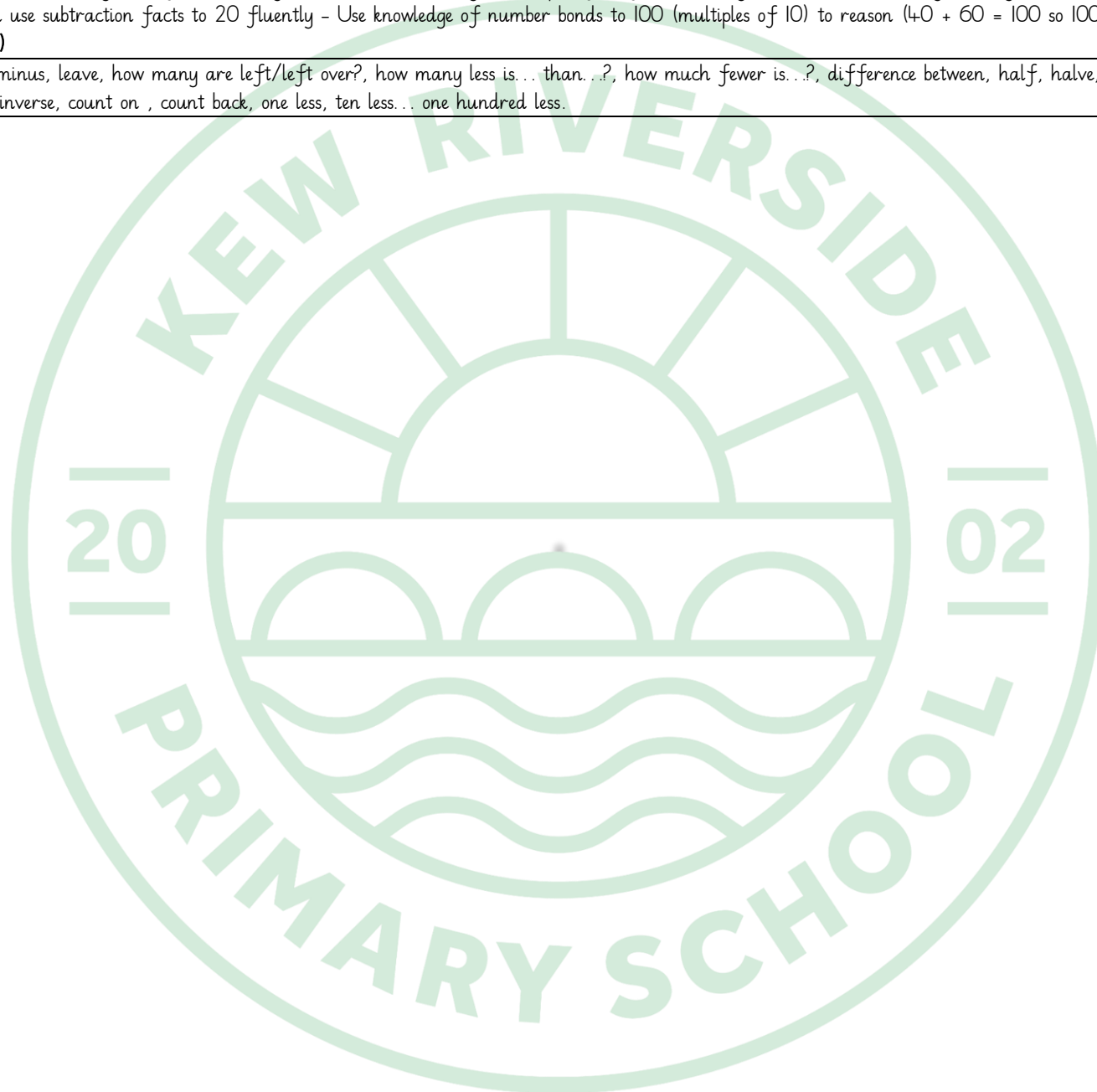
Children to show how they can make 10 by partitioning the subtrahend.

$$14 - 5 = 9$$

$$14 - 4 = 10$$
$$10 - 1 = 9$$

$$93 - 76 = 17$$

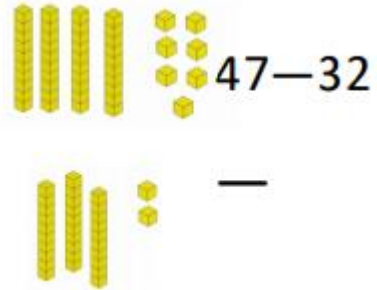
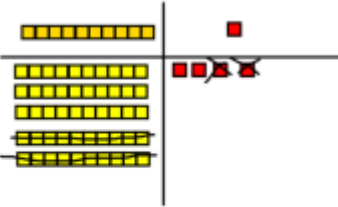

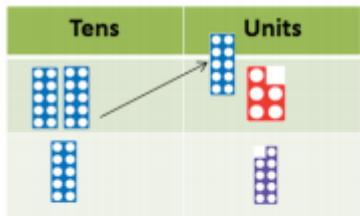
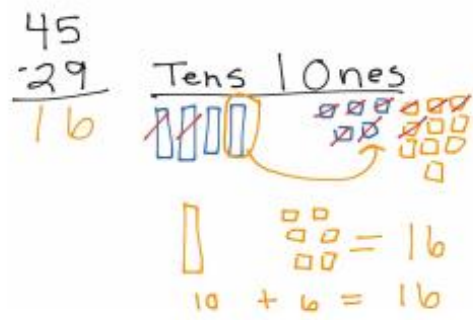
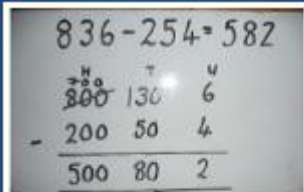
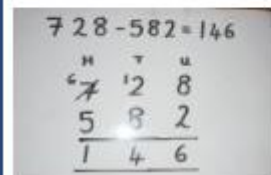
Mental Strategies	<p>- To know that subtraction is the inverse of addition - Use knowledge of inverse to check calculations and solve missing number problems - Subtract numbers mentally, including: subtracting units from a 2-digit number subtracting a multiple of 10 from a 2-digit number subtracting a 2-digit number from another 2-digit number - Recall and use subtraction facts to 20 fluently - Use knowledge of number bonds to 100 (multiples of 10) to reason ($40 + 60 = 100$ so $100 - 60 = 40$ and $100 - 40 = 60$) (See KIRFs)</p>
Vocabulary	<p>subtract, minus, leave, how many are left/left over?, how many less is... than...?, how much fewer is...?, difference between, half, halve, equals, sign, is the same as, partition, inverse, count on, count back, one less, ten less... one hundred less.</p>



Year 3

Subtraction

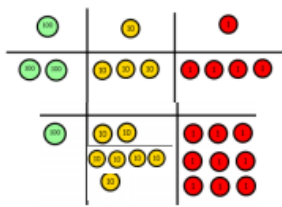
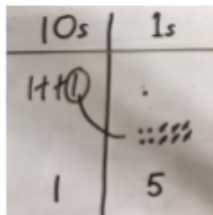
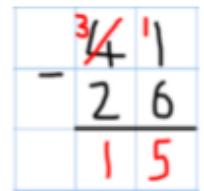
- subtract numbers mentally, including: - a three-digit number and ones - a three-digit number and tens - a three-digit number and hundreds - subtract numbers with up to three digits, using formal written methods of columnar subtraction - estimate the answer to a calculation and use inverse operations to check answers - solve problems, including missing number problems, using number facts, place value, and more complex subtraction.

	Concrete	Pictorial	Abstract
Column subtraction without regrouping (friendly numbers)	 <p>47 - 32</p> <p>Use base 10 or Numicon to model</p>	 <p>Calculations</p> $\begin{array}{r} 54 \\ - 22 \\ \hline 32 \end{array}$ <p>Darw representations to support understanding</p>	$47 - 24 = 23$ $\begin{array}{r} 40 + 7 \\ - 20 + 4 \\ \hline 20 + 3 \end{array}$ <p>Intermediate step may be needed to lead to clear subtraction understanding.</p> 
Column method with regrouping. (up to 3 digits using place value counters)	 <p>Begin with base 10 or Numicon. Move to pv counters, modelling the exchange of a ten into ten ones. Use the phrase 'take and make' for exchange.</p>	 <p>Children may draw base ten or PV counters and cross off.</p>	 <p>Begin by partitioning into pv columns</p>  <p>Then move to formal method.</p>
Mental Strategies	<p>- Subtract numbers mentally, including Subtracting a single digit number from a 3-digit number Subtracting a multiple of 10 from a 3-digit number. Subtracting a multiple of 10 from a 3-digit number - Estimate the answer to a calculation and use inverse operations to check answer (See KIRFs)</p>		
Vocabulary	<p>leave, subtract, less, minus, column subtraction, inverse, decomposition, exchange, how many are left/left over?, difference between, how many more/fewer is... than...?, how much more/less is...?, Is the same as, equals, sign. multiples of tens and hundreds.</p>		

Year 4

Subtraction

- subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate - estimate and use inverse operations to check answers to a calculation - subtraction two-step problems in contexts, deciding which operations and methods to use and why.

	Concrete	Pictorial	Abstract																		
<p>Column method with regrouping.</p> <p>(up to 4 digits)</p> <p>Introduce decimal subtraction through context of money</p>	<p>234 - 179</p>  <p>Model process of exchange using Numicon, base ten and then move to PV counters.</p> <div data-bbox="246 1029 840 1300"> <p>Column method using base 10 and having to exchange.</p> <p>41 - 26</p> <table border="1"> <tr> <td>10s</td> <td>1s</td> <td>10s</td> <td>1s</td> <td>10s</td> <td>1s</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td>5</td> </tr> </table> </div>	10s	1s	10s	1s	10s	1s											1	5	<p>Represent the base 10 pictorially, remembering to show the exchange.</p> 	<p>Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because $41 = 30 + 11$.</p> 
10s	1s	10s	1s	10s	1s																
				1	5																
Mental Strategies	<p>- Subtract numbers mentally, including: - Subtracting multiples of one thousand from a 4-digit number - Use of number pairs that total 1000 (multiples of 10) to calculate subtraction (e.g. $1000 - 300 = 700$) - Estimate the answer to a calculation and use inverse operations to check answers. (See KIRFs)</p>																				
Vocabulary	<p>subtract, subtraction, minus, decrease, leave, how many are left/left over?, difference between, how many more/fewer is... than...?, how much more/less is...?, Is the same as, equals, sign. Column subtraction, decomposition, exchange, multiples of thousand, inverse,</p>																				

Year 5

Subtraction

- subtract whole numbers with more than 4 digits, including using formal written methods - subtract numbers mentally with increasingly large numbers - use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy - solve multi-step problems in contexts, deciding which operations and methods to use and why.

Year 6

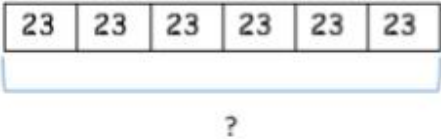






Subtraction

- perform mental calculations, including with mixed operations and large numbers - use their knowledge of the order of operations to carry out calculations involving the four operations - solve multi-step problems in contexts, deciding which operations and methods to use and why - use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. Algebra - use simple formulae - express missing number problems algebraically - find pairs of numbers that satisfy an equation with two unknowns

	Concrete	Pictorial	Abstract																
<p>Column method with regrouping.</p> <p>Abstract methods.</p> <p>Place value counters for decimals- with different amounts of decimal places.</p>	<table border="1"> <thead> <tr> <th>Tens of Thousands 10,000</th> <th>Thousands 1000</th> <th>Hundreds 100</th> <th>Tens 10</th> <th>Ones 1</th> <th>Decimal point .</th> <th>Tenths $\frac{1}{10}$ 0.1</th> <th>Hundredths $\frac{1}{100}$ 0.01</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Tens of Thousands 10,000	Thousands 1000	Hundreds 100	Tens 10	Ones 1	Decimal point .	Tenths $\frac{1}{10}$ 0.1	Hundredths $\frac{1}{100}$ 0.01										<p>This will lead to an understanding of subtracting any number including decimals.</p> $ \begin{array}{r} 5 12 \\ 2 \cancel{6} \cancel{3} . 0 \\ - 2 6 . 5 \\ \hline 2 3 6 . 5 \end{array} $
Tens of Thousands 10,000	Thousands 1000	Hundreds 100	Tens 10	Ones 1	Decimal point .	Tenths $\frac{1}{10}$ 0.1	Hundredths $\frac{1}{100}$ 0.01												
Mental Strategies	<p>- Subtract increasingly large numbers mentally (e.g $12, 654 - 1,341 = 11, 213$) - Subtract decimal numbers mentally (up to 2 decimal places) - Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. (See KIRFs)</p>																		
Vocabulary	<p>order of operations, subtract, decrease, difference, inverse, decimals, units , tenths and hundredths boundary, column subtraction, decomposition, exchange.</p>																		

	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication	<p>Recognising and making equal groups.</p> <p>Doubling</p> <p>Counting in multiples Use cubes, Numicon and other objects in the classroom</p>	<p>Arrays- showing commutative multiplication</p>	<p>Arrays</p> <p>2d x 1d using base 10</p>	<p>Column multiplication- introduced with place value counters.</p> <p>(2 and 3 digit multiplied by 1 digit)</p>	<p>Column multiplication</p> <p>Abstract only but might need a repeat of year 4 first (up to 4 digit numbers multiplied by 1 or 2 digits)</p>	<p>Column multiplication</p> <p>Abstract methods (multi-digit up to 4 digits by a 2 digit number)</p>

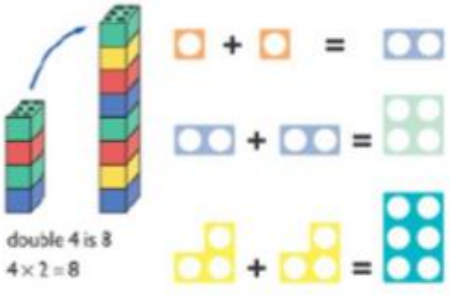

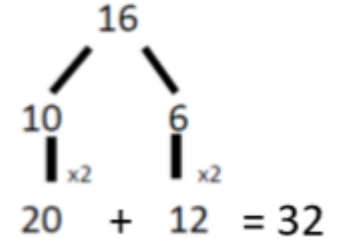
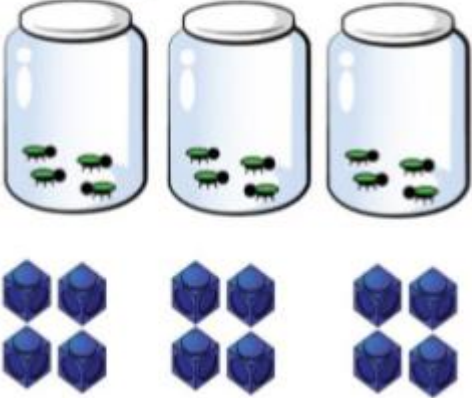
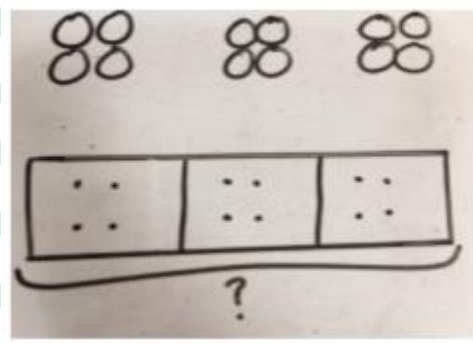
Conceptual variation; different ways to ask children to solve 6×23

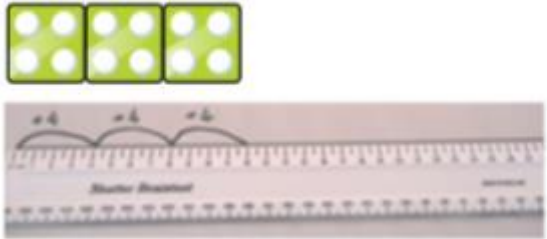
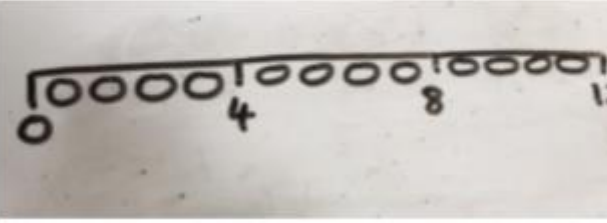
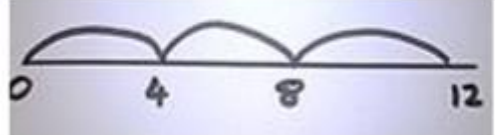
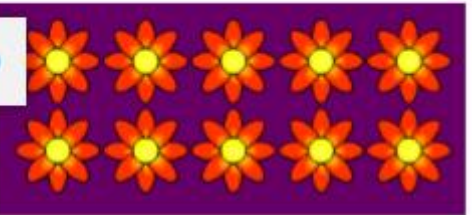
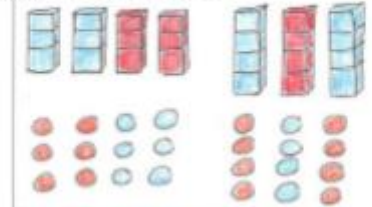
	<p>Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week?</p> <p>With the counters, prove that $6 \times 23 = 138$</p>	<p>Find the product of 6 and 23</p> <p>$6 \times 23 =$</p> <p>$\square = 6 \times 23$</p> $\begin{array}{r} 6 \quad 23 \\ \times 23 \quad \times 6 \\ \hline \end{array}$	<p>What is the calculation? What is the product?</p> <table border="1" data-bbox="1579 1021 2060 1252"> <thead> <tr> <th>100s</th> <th>10s</th> <th>1s</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	100s	10s	1s			
100s	10s	1s							
									

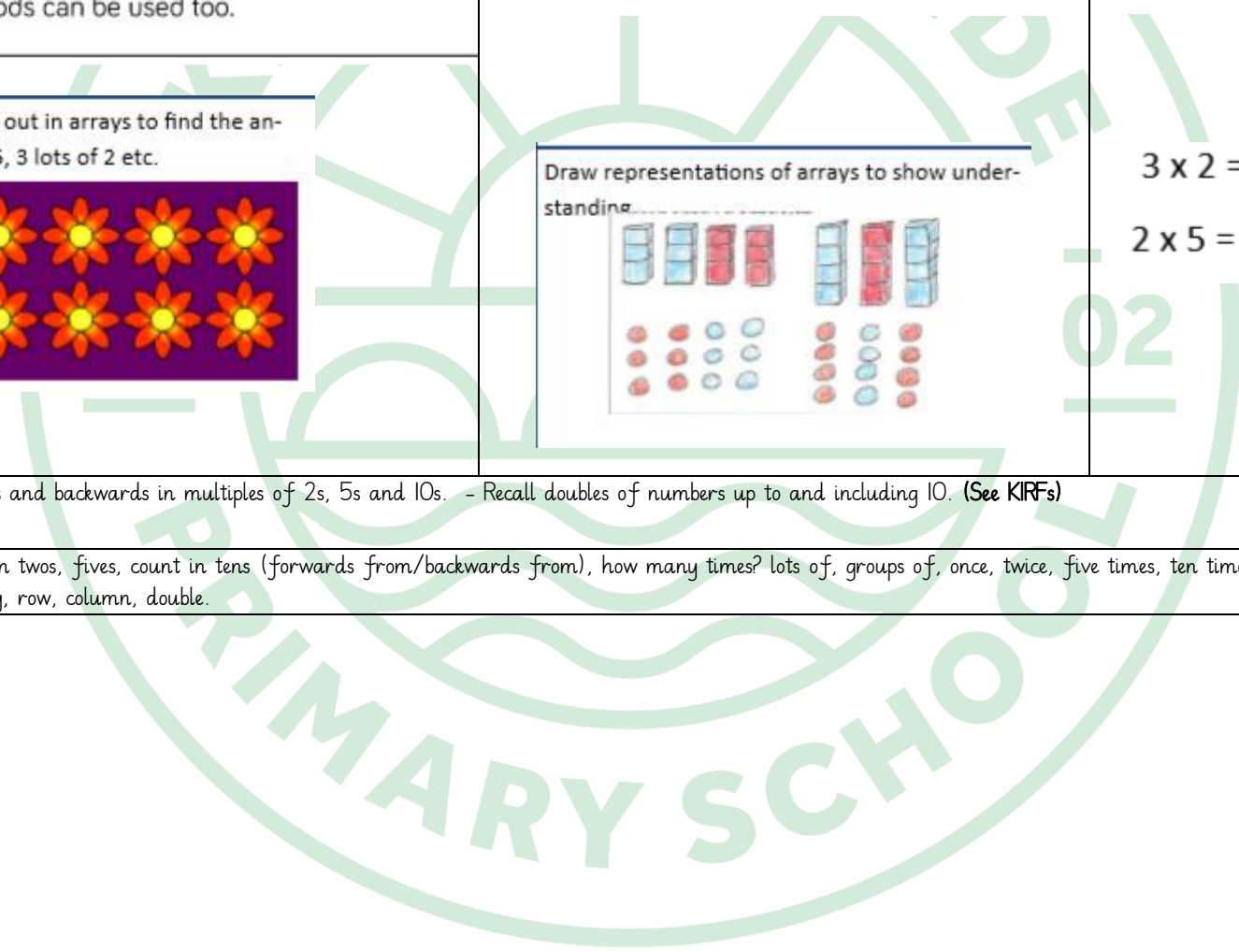
EYFS/Year 1

Multiplication

- solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

	Concrete	Pictorial	Abstract
Doubling	<p>Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling</p>  <p>double 4 is 8 $4 \times 2 = 8$</p>	<p>Draw pictures to show how to double numbers</p> <p>Double 4 is 8</p> 	<p>Partition a number and then double each part before recombining it back together.</p> 
<p>Recognising and making equal groups.</p> <p>Counting in multiples Use cubes, Numicon and other objects in the classroom</p>	<p>Repeated grouping/repeated addition</p> <p>3×4 $4 + 4 + 4$ There are 3 equal groups, with 4 in each group.</p> 		<p>$3 \times 4 = 12$</p> <p>$4 + 4 + 4 = 12$</p>


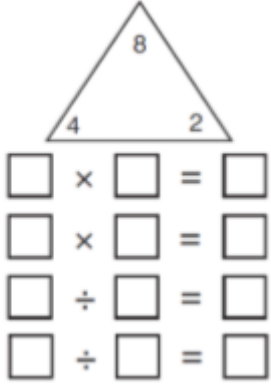
Understanding arrays	<p>Number lines to show repeated groups- 3×4</p>  <p>Cuisenaire rods can be used too.</p>	<p>Represent this pictorially alongside a number line</p> 	<p>Abstract number line showing three jumps of four.</p> <p>$3 \times 4 = 12$</p> 
	<p>Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc.</p> 	<p>Draw representations of arrays to show understanding</p> 	<p>$3 \times 2 = 6$</p> <p>$2 \times 5 = 10$</p>
Mental Strategies	<p>- Count forwards and backwards in multiples of 2s, 5s and 10s. - Recall doubles of numbers up to and including 10. (See KIRFs)</p>		
Vocabulary	<p>odd, even, count in twos, fives, count in tens (forwards from/backwards from), how many times? lots of, groups of, once, twice, five times, ten times, multiple of, times, multiply, multiply by, array, row, column, double.</p>		

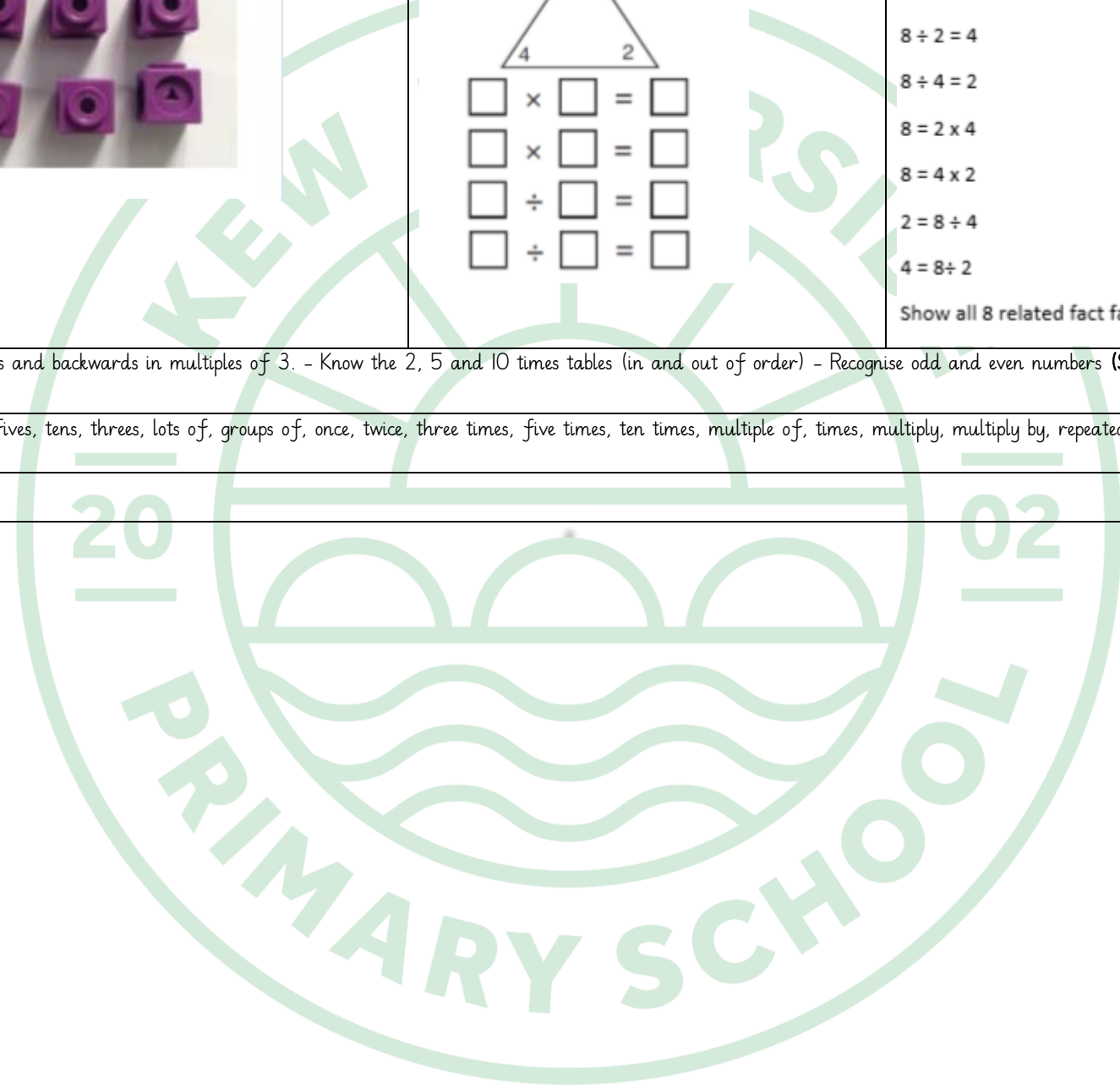


Year 2

Multiplication

- recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers - calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (\times) and equals (=) signs - show that multiplication of two numbers can be done in any order (commutative) - solve problems involving multiplication using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts.

<p>Using the Inverse</p> <p><i>This should be taught alongside division, so pupils learn how they work alongside each other.</i></p>			$2 \times 4 = 8$ $4 \times 2 = 8$ $8 \div 2 = 4$ $8 \div 4 = 2$ $8 = 2 \times 4$ $8 = 4 \times 2$ $2 = 8 \div 4$ $4 = 8 \div 2$ <p>Show all 8 related fact family sentences.</p>
<p>Mental Strategies</p>	<p>- Count forwards and backwards in multiples of 3. - Know the 2, 5 and 10 times tables (in and out of order) - Recognise odd and even numbers (See KIRFs)</p>		
<p>Vocabulary</p>	<p>odd, even, twos, fives, tens, threes, lots of, groups of, once, twice, three times, five times, ten times, multiple of, times, multiply, multiply by, repeated addition, array, row, column, double.</p>		
<p>Times Tables</p>	<p>2, 5, 10</p>		



Year 3

Multiplication

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables - write and calculate mathematical statements for multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods - solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Concrete

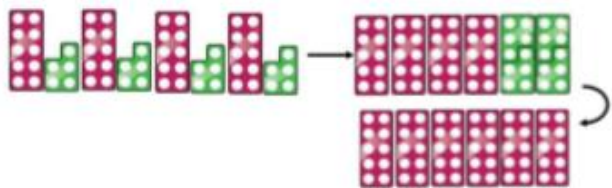
Pictorial

Abstract

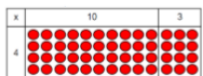
Arrays
 $2d \times 1d$
using base 10

Partition to multiply using Numicon, base 10 or Cuisenaire rods.

4×15

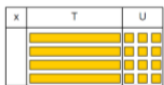


4×13



4 rows of 10
4 rows of 3

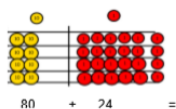
Move on to using Dienes to move towards a more compact method.



4 rows of 13

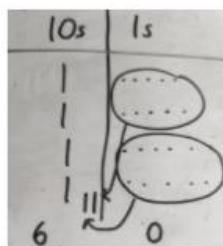
Move on to place value counters to show how we are finding groups of a number.

4×26



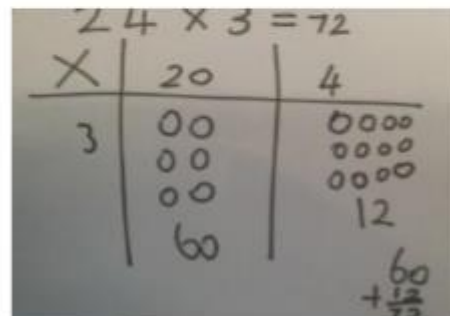
We are multiplying by 4 so we need 4 rows with each containing 26.

Children to represent the concrete manipulatives pictorially.



Children can represent the work they have done with place value counters in a way that they understand.

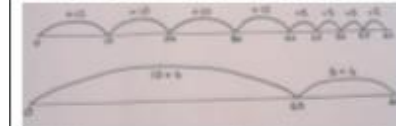
They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.



Children to be encouraged to show the steps they have taken.

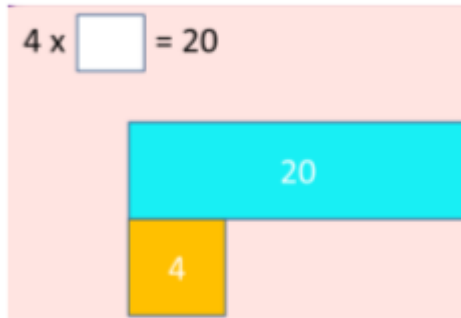
4×15
10 5
 $10 \times 4 = 40$
 $5 \times 4 = 20$
 $40 + 20 = 60$

A number line can also be used



	10	8
10	100	80
3	30	24

Bar model are used to explore missing numbers



Start with multiplying 2-digit by 1-digit numbers showing the addition alongside the grid.

x	30	5
7	210	35

$$210 + 35 = 245$$

Moving forward, multiply 2, 3 and 4-digit numbers showing the different rows within the grid method.

13 x 28			
x	20	8	
10	200	80	280
3	60	24	+ 84
			<u>364</u>
			1

Mental Strategies

- Count forwards and backwards in multiples of 4, 8, 50 & 100 - Know the 3, 4 and 8 times tables (in any order) - Connect the 2, 4 and 8 times tables through doubling - Use knowledge of place value to calculate multiplication (e.g. $2 \times 2 = 4$, $2 \times 20 = 40$, $2 \times 200 = 400$) (See KIRFs)

Vocabulary

multiply, times, groups of, equal groups of, multiple of, multiplied by, estimate, inverse, grid multiplication, expanded column multiplication, partition, commutative, associative, product.


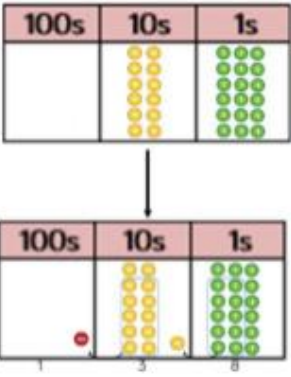
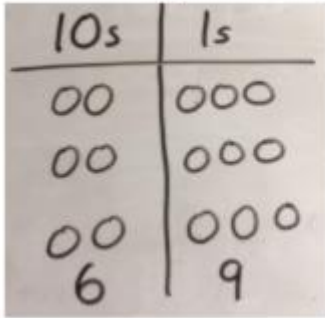
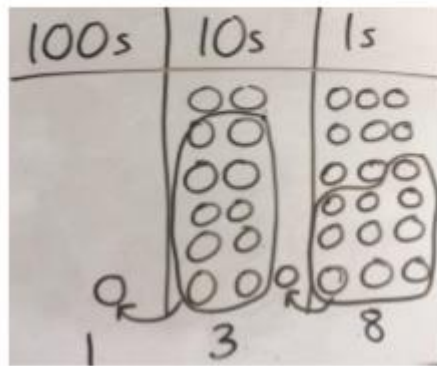
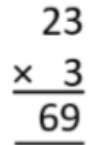
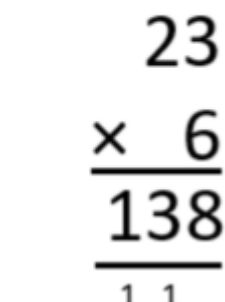
Times Tables

Consolidate- 2, 5, 10
Learn- 3, 4, 8

Multiplication

- recall multiplication tables up to 12×12 - use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers - recognise and use factor pairs and commutativity in mental calculations - multiply two-digit and three-digit numbers by a one-digit number using formal written layout - solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

	Concrete	Pictorial	Abstract																																											
Column multiplication	<p>Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. $321 \times 2 = 642$</p> <table border="1"> <thead> <tr> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>It is important at this stage that they always multiply the ones first.</p> <p>The corresponding long multiplication is modelled alongside</p>	Hundreds	Tens	Ones													<table border="1"> <tr> <td>x</td> <td>300</td> <td>20</td> <td>7</td> </tr> <tr> <td>4</td> <td>1200</td> <td>80</td> <td>28</td> </tr> </table> <p>The grid method may be used to show how this relates to a formal written method.</p> <p>Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.</p>	x	300	20	7	4	1200	80	28	<p>For 38×7</p> $\begin{array}{r} 38 \\ \times 7 \\ \hline 56 \\ 210 \\ \hline 266 \end{array}$ <p>$8 \times 7 = 56$ $30 \times 7 = 210$</p> $\begin{array}{r} 327 \\ \times 4 \\ \hline 28 \\ 80 \\ 1200 \\ \hline 1308 \end{array}$ <p>This may lead to a compact method.</p> <table border="1"> <tr> <td></td> <td>3</td> <td>2</td> <td>7</td> </tr> <tr> <td>x</td> <td></td> <td></td> <td>4</td> </tr> <tr> <td></td> <td>1</td> <td>3</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td>1</td> <td>2</td> </tr> <tr> <td></td> <td></td> <td></td> <td>8</td> </tr> </table>		3	2	7	x			4		1	3	0			1	2				8
Hundreds	Tens	Ones																																												
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<p>Column multiplication-introduced with place value counters.</p> <p>(2 and 3 digit multiplied by 1 digit)</p>	<p>Formal column method with place value counters (base 10 can also be used.) 3×23</p>  <p>Formal column method with place value counters. 6×23</p> 	<p>Children to represent the counters pictorially.</p>  <p>Children to represent the counters/base 10, pictorially e.g. the image below.</p> 	<p>Children to record what it is they are doing to show understanding.</p> $\begin{array}{r} 3 \times 23 \\ 20 \quad 3 \end{array}$ $\begin{array}{r} 3 \times 20 = 60 \\ 3 \times 3 = 9 \\ 60 + 9 = 69 \end{array}$  <p>Formal written method</p> $6 \times 23 =$ 
<p>Mental Strategies</p>	<p>- Know all times tables up to and including 12×12 (by the end of Year 4) - Recognise and use factor pairs (e.g. factor pairs for numbers up to and including 10) - Know that $TU \times 5$ is $TU \times 10$ then divide by 2 (e.g. $18 \times 5 = (18 \times 10) \div 2 = 90$) - Know that $TU \times 9$ is $TU \times 10$ then subtract TU (e.g. $18 \times 9 = (18 \times 10) - 18 = 162$) (See KIRFs)</p>		
<p>Vocabulary</p>	<p>multiply, multiplied by, product, short multiplication, partition, distributive law, commutative, groups of, multiply, times, multiples, inverse.</p>		
<p>Times Tables</p>	<p>Consolidate- 2, 5, 10 (yr 2) 3, 4, 8 (yr 3) Learn- 6, 7, 9, 11, 12</p>		

Year 5

Multiplication

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers - know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers - establish whether a number up to 100 is prime and recall prime numbers up to 19 - multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers - multiply numbers mentally drawing upon known facts - multiply and whole numbers and those involving decimals by 10, 100 and 1000 recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3) - solve problems involving multiplication including using their 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

	Concrete	Pictorial	Abstract																													
<p>Column multiplication</p> <p>Abstract only but might need a repeat of year 4 first (up to 4 digit numbers multiplied by 1 or 2 digits)</p>	<p>Whitney uses Base 10 to calculate 23×22</p>	<table border="1"> <tr> <td>×</td> <td>40</td> <td>4</td> </tr> <tr> <td>30</td> <td>1,200</td> <td>120</td> </tr> <tr> <td>2</td> <td>80</td> <td>8</td> </tr> </table>	×	40	4	30	1,200	120	2	80	8	<table border="1"> <tr> <td></td> <td></td> <td>2</td> <td>3</td> <td></td> </tr> <tr> <td>×</td> <td></td> <td>1</td> <td>4</td> <td></td> </tr> <tr> <td></td> <td></td> <td>9</td> <td>2</td> <td>(23×4)</td> </tr> <tr> <td></td> <td>2</td> <td>3</td> <td>0</td> <td>(23×10)</td> </tr> </table>			2	3		×		1	4				9	2	(23×4)		2	3	0	(23×10)
×	40	4																														
30	1,200	120																														
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		2	3																													
×		1	4																													
		9	2	(23×4)																												
	2	3	0	(23×10)																												
Mental Strategies	<p>- Recognise and calculate factor pairs for any number - Use times table knowledge to derive multiples of any number - Establish whether a number is a prime number (up to 100) or a composite number (not prime) and recall prime numbers up to 19 - To know what a square number is and recall all square numbers (up to and including 144) - To know what a cube number is and recall the first 5 cube numbers (See KIRFs)</p>																															
Vocabulary	<p>composite numbers, prime number, prime factor, cube number, square number, derive, factor pairs, formal written method, times, multiply, multiplied by, multiple of, product, short multiplication, partition, long multiplication, scaling, decimal place, units, tenths and hundreds.</p>																															
Times Tables	<p>Know all times tables up to and including 12×12 and related division facts</p>																															

Year 6

Multiplication

- multiply multi-digit numbers up to 4 digits by a two digit whole number using the formal written method of long multiplication - perform mental calculations, including with mixed operations and large numbers - identify common factors, common multiples and prime numbers - use their knowledge of the order of operations to carry out calculations involving the four operations - use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. Ratio & Proportion - solve problems involving the relative sizes of two quantities where missing values can be found by using integer - multiplication and division on facts - solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison - solve problems involving similar shapes where the scale factor is known or can be found - solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. Algebra - use simple formulae - express missing number problems algebraically - find pairs of numbers that satisfy an equation with two unknowns

Concrete

Pictorial

Abstract

Column multiplication

Abstract methods (multi-digit up to 4 digits by a 2 digit number)

Work out the multiplication.

$$534 \times 17 = \boxed{9,078}$$

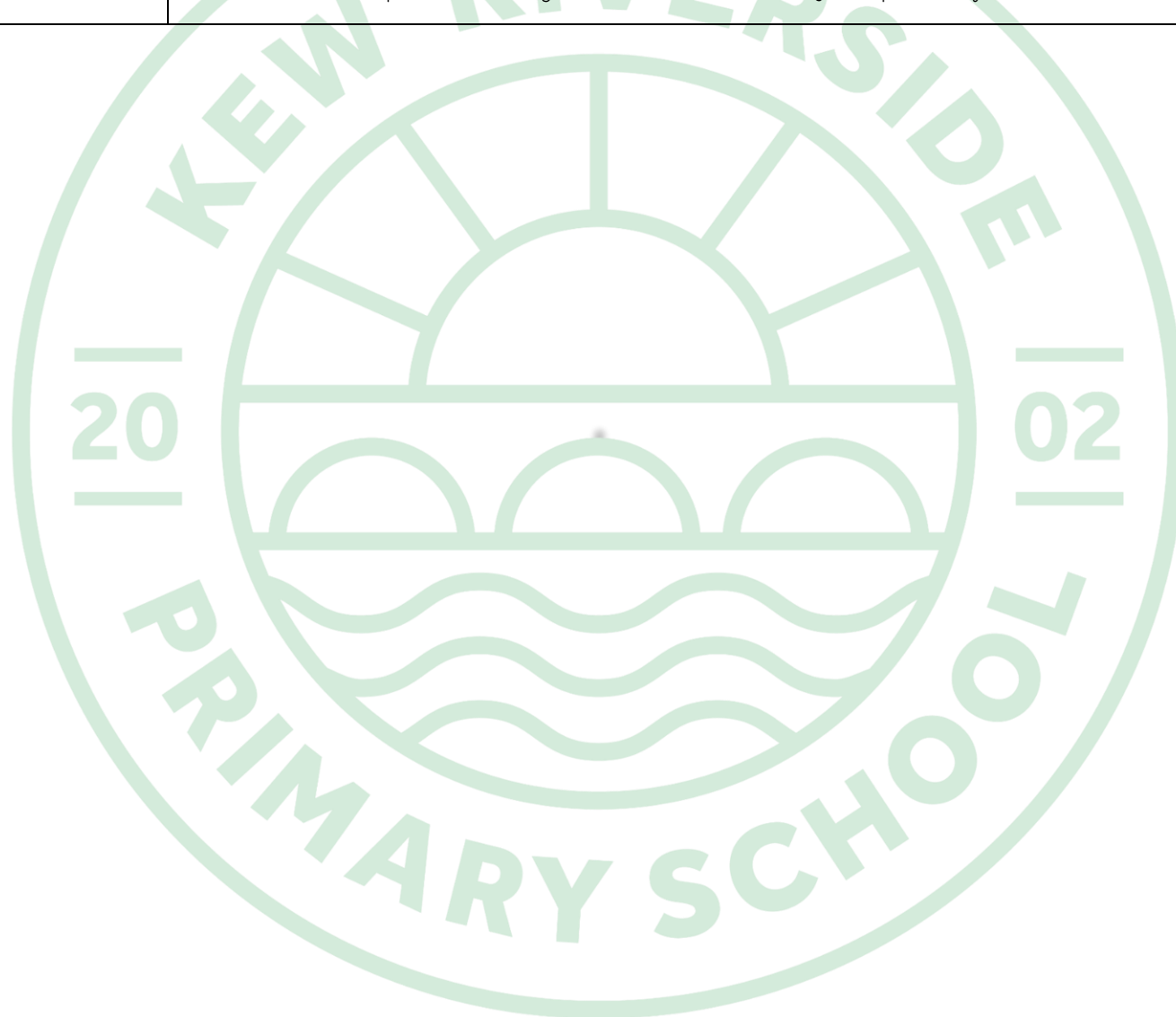
	Th	H	T	O	
		5	3	4	
×			1	7	
	3	7	3	8	(534 × 7)
+	5	3	4	0	(534 × 10)
	9	0	7	8	
	1	1			

Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer.

$$\begin{array}{r} 3.19 \\ \times 8 \\ \hline 25.52 \end{array}$$

Multiplying decimals up to 2 decimal places by a single digit.

Mental Strategies	<ul style="list-style-type: none"> - Use scaling to solve decimal number problems as whole number problems using the rule: 'the number of decimal digits in the question is the same as the number of decimal digits in the answer' - Identify common factors, common multiples and prime numbers - Use common factors to simplify fractions mentally - Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy (See KIRFs)
Vocabulary	<p>common factors, multiples, prime, formal written method, multiply, multiplied by, multiple of, product, short and long multiplication, partition, scaling, decimal place, units, tenths and hundredths.</p>
Times Tables	<p>Know all times tables up to and including 12 x 12 and related division facts/ powers/ square roots/ BIDMAS</p>



Division

EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Sharing objects into groups</p> <p>Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups?</p> <p>Use cubes and draw round 3 cubes at a time.</p>	<p>Division as grouping</p> <p>Division within arrays- linking to multiplication</p> <p>Repeated subtraction</p>	<p>Division with a remainder-using lollipop sticks, times tables facts and repeated subtraction.</p> <p>2d divided by 1d using base 10 or place value counters</p>	<p>Division with a remainder</p> <p>Short division (up to 3 digits by 1 digit- concrete and pictorial)</p>	<p>Short division</p> <p>(up to 4 digits by a 1 digit number including remainders)</p>	<p>Short division</p> <p>Long division with place value counters (up to 4 digits by a 2 digit number)</p> <p>Children should exchange into the tenths and hundredths column too</p>

Conceptual variation; different ways to ask children to solve $615 \div 5$

Using the part whole model below, how can you divide 615 by 5 without using short division?



I have £615 and share it equally between 5 bank accounts. How much will be in each account?

615 pupils need to be put into 5 groups. How many will be in each group?

$$5 \overline{)615}$$

$$615 \div 5 =$$

$$\square = 615 \div 5$$

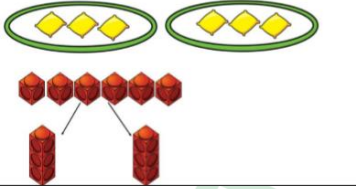
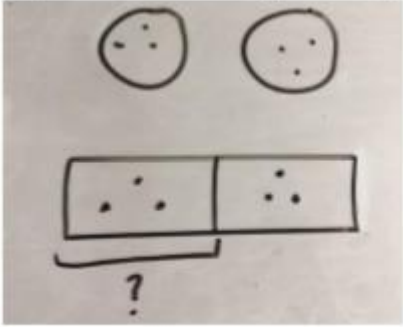
What is the calculation?
What is the answer?



EYFS/Year 1

Division

- solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

	Concrete	Pictorial	Abstract		
<p>Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups?</p> <p>Use cubes and draw round 3 cubes at a time.</p>	<p>Sharing using a range of objects. $6 \div 2$</p> 	<p>Represent the sharing pictorially.</p> 	<p>$6 \div 2 = 3$</p> <table border="1" data-bbox="1525 509 1980 579"> <tr> <td>3</td> <td>3</td> </tr> </table> <p>Children should also be encouraged to use their 2 times tables facts.</p>	3	3
3	3				
Mental Strategies	Count forwards and backwards in multiples of 2s, 5s and 10s. (See KIRFs)				
Vocabulary	halve, share, share equally, groups, equal groups of, divide, divided by, left, left over				

Year 2

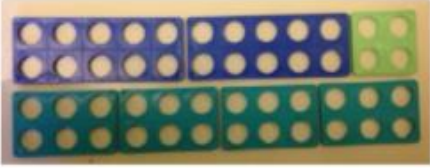
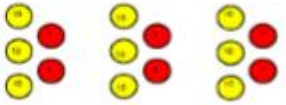


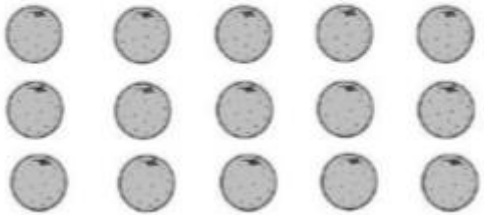
Division


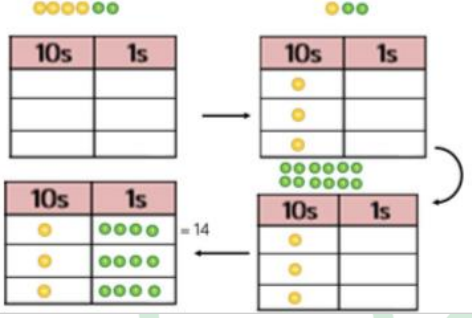
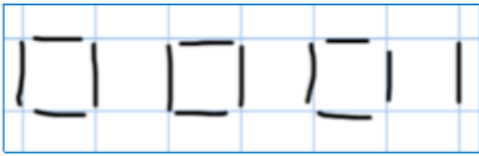
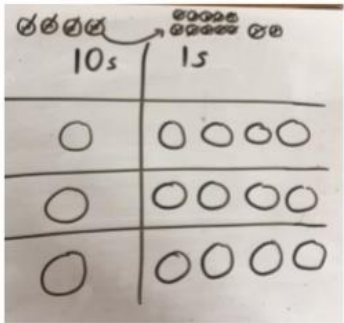
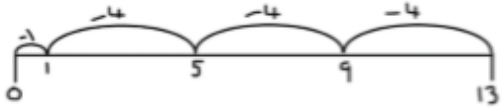
- recall and use division facts for the 2, 5 and 10 multiplication tables - calculate mathematical statements for division within the multiplication tables and write them using division (\div) and equals (=) signs - show that division of one number by another must be done in the order stated - solve problems involving division, using materials, arrays, repeated subtraction, mental methods, and division facts, including problems in contexts.

Year 3

Division

- recall and use division facts for the 3, 4 and 8 multiplication tables - write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods - solve problems, including missing number problems, involving division

	Concrete	Pictorial	Abstract
Division as grouping	<p>Use cubes, counters, objects or place value counters to aid understanding.</p>  <p>24 divided into groups of 6 = 4</p> $96 \div 3 = 32$ 	<p>Continue to use bar modelling to aid solving division problems.</p>  <p>20</p> $20 \div 5 = ?$ $5 \times ? = 20$	<p>How many groups of 6 in 24?</p> $24 \div 6 = 4$
Division with arrays	 <p>Link division to multiplication by creating an array and thinking about the number sentences that can be created.</p> <p>Eg $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$</p>	<p>Draw an array and use lines to split the array into groups to make multiplication and division sentences</p> 	<p>Find the inverse of multiplication and division sentences by creating eight linking number sentences.</p> $7 \times 4 = 28$ $4 \times 7 = 28$ $28 \div 7 = 4$ $28 \div 4 = 7$ $28 = 7 \times 4$ $28 = 4 \times 7$ $4 = 28 \div 7$ $7 = 28 \div 4$

<p>Division with a remainder—using lollipop sticks, times tables facts and repeated subtraction.</p> <p>2d divided by 1d using base 10 or place value counters</p>	<p>2d + 1d with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used. $13 \div 4$</p> <p>Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.</p>  <p>There are 3 whole squares, with 1 left over.</p> <p>Sharing using place value counters. $42 \div 3 = 14$</p> 	<p>Children to represent the lollipop sticks pictorially.</p>  <p>There are 3 whole squares, with 1 left over.</p> <p>Children to represent the place value counters pictorially.</p> 	<p>$13 \div 4 = 3$ remainder 1</p> <p>Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line.</p> <p>'3 groups of 4, with 1 left over'</p>  <p>Children to be able to make sense of the place value counters and write calculations to show the process.</p> <p> $42 \div 3$ $42 = 30 + 12$ $30 \div 3 = 10$ $12 \div 3 = 4$ $10 + 4 = 14$ </p>
<p>Mental Strategies</p>	<p>- Know the division facts from the 3, 4 and 8 times tables - Use knowledge of place value to calculate division (e.g. $14 \div 2 = 7$, $140 \div 2 = 70$, $1400 \div 2 = 700$) (See KIRFs)</p>		
<p>Vocabulary</p>	<p>divided by, divide, divided into, grouping, divisor, short division, remainder, inverse.</p> <p style="text-align: center;"> $\begin{array}{r} \text{quotient} \\ \text{divisor } \overline{) \text{dividend}} \end{array}$ </p>		

Year 4

Division

- recall division facts for multiplication tables up to 12×12 - use place value, known and derived facts to divide mentally, including: dividing by 1;

Concrete

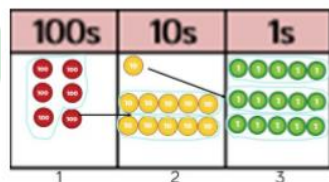
Pictorial

Abstract

Division with a remainder

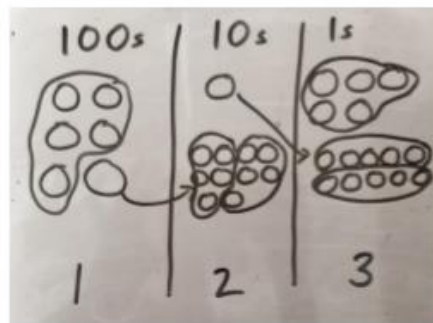
Short division (up to 3 digits by 1 digit- concrete and pictorial)

Short division using place value counters to group.
 $615 \div 5$



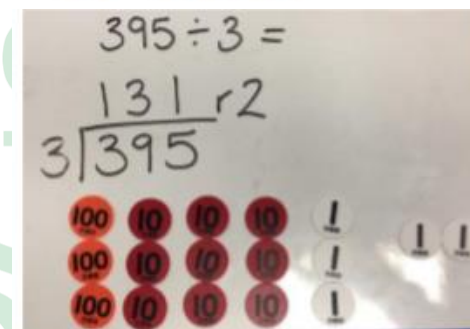
1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?

Represent the place value counters pictorially.



Children to the calculation using the short division scaffold.

$$\begin{array}{r} 123 \\ 5 \overline{) 615} \end{array}$$



Mental Strategies

Know all related division facts for all times tables up to 12 times table (by the end of Year 4) (See KIRFs)

Vocabulary

factor, divisor, divided by, divided into, remainders, divisible by, equivalent, short division, derive, Quotient, inverse, remainder, multiples, exchange.

$$\begin{array}{r} \text{quotient} \\ \text{divisor } \overline{) \text{dividend}} \end{array}$$

Division bracket

Year 5

Division

- divide numbers mentally drawing upon known facts - divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context - divide whole numbers and those involving decimals by 10, 100 and 1000 - solve problems involving, squares and cubes - solve problems involving addition, subtraction, multiplication and division and a combination of these, - solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

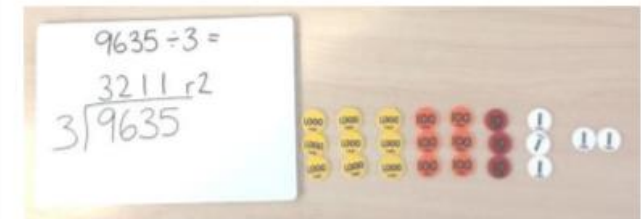
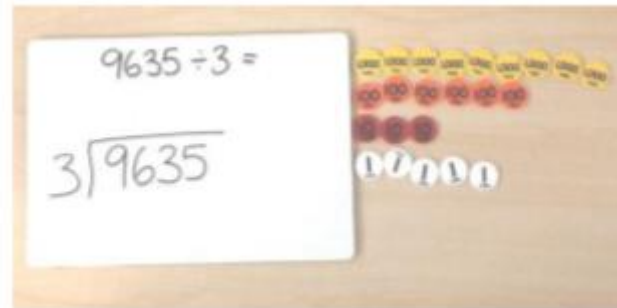
Concrete

Pictorial

Abstract

Short division

(up to 4 digits by a 1 digit number including remainders)



Group the units counters according to the divisor and write the number of groups about the line in the units column. Express remainders as 'r2' as part of the quotient.

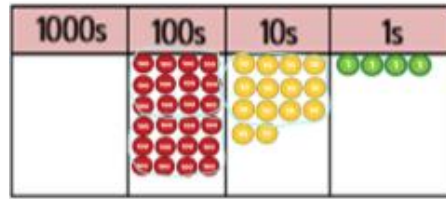
Mental Strategies

- Multiply and divide numbers mentally drawing upon known facts - Associate fractions with division (See KIRFs)

Vocabulary

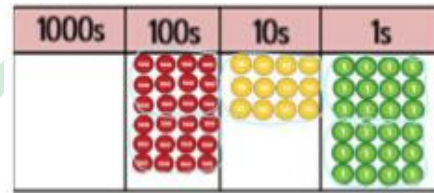
divide, divided by, divided into, divisible by, remainder, quotient, inverse, decomposing, factor, decimal place, units, tenths, scaling, short division.

$$\begin{array}{r} \text{quotient} \\ \text{divisor } \overline{) \text{dividend}} \end{array}$$



After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

$$\begin{array}{r} 021 \\ 12 \overline{) 2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 2 \end{array}$$



After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

$$\begin{array}{r} 0212 \\ 12 \overline{) 2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

Mental Strategies

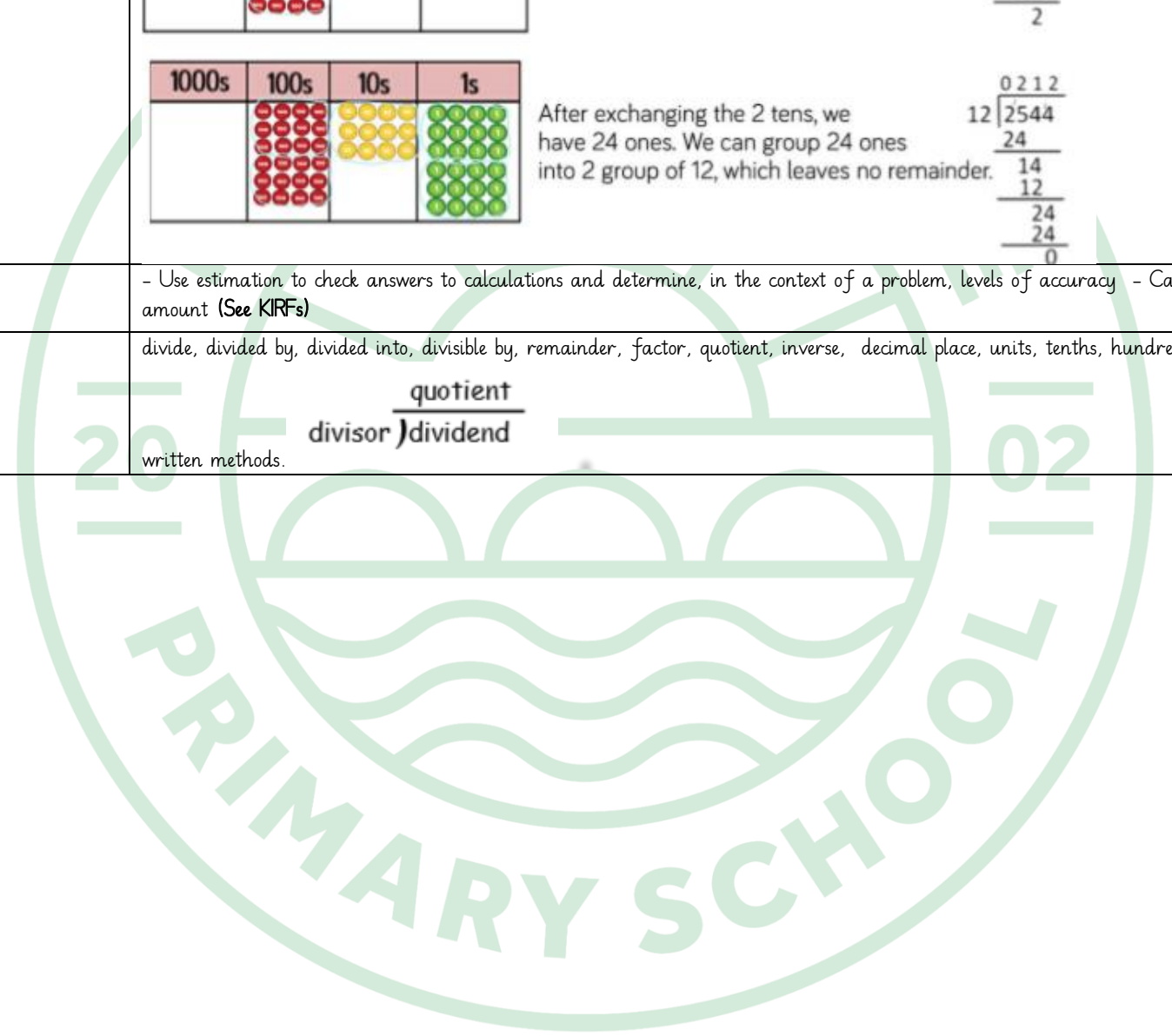
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy - Calculate a fraction of an amount (See KIRFs)

Vocabulary

divide, divided by, divided into, divisible by, remainder, factor, quotient, inverse, decimal place, units, tenths, hundredths, scaling, formal

$$\begin{array}{r} \text{quotient} \\ \text{divisor } \overline{) \text{dividend}} \end{array}$$

written methods.



Key Instant Recall Facts (KIRFs)

By the end of an academic year, pupils should be able to recall the **Key Instant Recall Facts** for their year group quickly (within 5 seconds) and complete counting activities confidently and fluently. Children should also be able to recall the **Key Instant Recall Facts** for all previous year groups within the same amount of time.

Year 1	Autumn 1	I know number bonds to 6
	Autumn 2	I can count in 2s, 5s and 10s
	Spring 1	I know doubles and halves of numbers to 10
	Spring 2	I know number bonds to 10
	Summer 1	I know the days, weeks, months and seasons.
	Summer 2	I know my number bonds for each number to 10
Year 2	Autumn 1	I know number bonds to 20.
	Autumn 2	I know the multiplication and division facts for the 2 times table.
	Spring 1	I know double and halves to 20
	Spring 2	I know the multiplication and division facts for the 10 times table.
	Summer 1	I can tell the time to the nearest 5 minutes
	Summer 2	I know the multiplication and division facts for the 5 times table.
Year 3	Autumn 1	I know number bonds for all numbers to make 20.
	Autumn 2	I know the multiplication and division facts for the 3 times table.
	Spring 1	I can recall facts about durations in time.
	Spring 2	I know the multiplication and division facts for the 4 times table.
	Summer 1	I can tell the time to the nearest minute.
	Summer 2	I know the multiplication and division facts for the 8 times table.

Year 4	Autumn 1	I know number bonds for all numbers to make 100.
	Autumn 2	I know the multiplication and division facts for the 6 times table.
	Spring 1	I know the multiplication and division facts for the 9 and 11 times tables.
	Spring 2	I can recognise decimal equivalents of fractions.
	Summer 1	I know the multiplication and division facts for the 7 and 12 times table. (Children should now know the multiplication and division facts up to 12x12)
	Summer 2	I can multiply and divide single-digit numbers by 10 and 100.
Year 5	Autumn 1	I know decimal number bonds 10 and 10
	Autumn 2	I know multiplication and division facts up to 12x12 (recap)
	Spring 1	I can recall metric conversions.
	Spring 2	I can identify prime numbers up to 20
	Summer 1	I can recall square numbers up to 12 squared and their square roots.
	Summer 2	I can find factor pairs of a number.
Year 6	Autumn 1	I know multiplication and division facts up to 12 x12
	Autumn 2	I can identify common factors of a pair of numbers.
	Spring 1	I can convert between decimals, fractions and percentages.
	Spring 2	I can identify prime numbers up to 50
	Summer 1	Consolidation
	Summer 2	Consolidation

Year 1

Topic	Facts taught in this year group	Facts taught in previous year groups
Number and Place Value	<ul style="list-style-type: none"> • Count to and across 100, forwards and backwards, from 0, 1 or any number. • Count, read and write numbers to 100 in numerals. • Read and write numbers from 1 to 20 in words. • Identify one more and one less than any number (to 100). 	<ul style="list-style-type: none"> • Read and write numbers from 1 to 20 in numerals • Identify one more and one less than any number (to 20) • Ordinal numbers (1st, 2nd, 3rd)
Addition and Subtraction	<ul style="list-style-type: none"> • Be able to work out number bonds to all numbers within 10. • Be able to work out number bonds to 10. 	
Multiplication and Division	<ul style="list-style-type: none"> • Count in 2s to 20, 5s to 50 and 10s to 100. 	
Measurement	<ul style="list-style-type: none"> • Know how many days are in a week • Know how many months are in a year. • Know when key events happen (e.g. Christmas) 	<ul style="list-style-type: none"> • Know the days of the week in order • Know the months of the year in order.
Properties of Shapes	<ul style="list-style-type: none"> • Recognise and name 2D shapes (rectangles, squares, circles and triangles). • Recognise and name 3D shapes (cubes, cuboids, pyramids and spheres). 	<ul style="list-style-type: none"> • Recognise and name 2D shapes (rectangles, squares, circles and triangles).

Year 2

Topic	Facts taught in this year group	Facts taught in previous year groups
Number and Place Value	<ul style="list-style-type: none"> • Count forwards and backwards in 3s from 0. • Count forwards and backwards in 10s from any number. • Read and write numbers to 100 in words. • Recognise odd and even numbers to 100 	<ul style="list-style-type: none"> • Count forwards and backwards in 2s and 5s from 0. • Read and write numbers to 100 in numerals.
Addition and Subtraction		<ul style="list-style-type: none"> • Know number bonds to all numbers within 10. • Know number bonds to 10.
Multiplication and Division	<ul style="list-style-type: none"> • Know doubles and halves to 20. • Know multiplication and division facts for the 2, 5 and 10 times tables. 	<ul style="list-style-type: none"> • Count in 2s to 20, 5s to 50 and 10s to 100.
Measurement	<ul style="list-style-type: none"> • Know the number of minutes in an hour. • Know the number of hours in a day. 	<ul style="list-style-type: none"> • Know the value of all coins and notes
Properties of Shapes		<ul style="list-style-type: none"> • Recognise and name 2D shapes (rectangles, squares, circles and triangles). • Recognise and name 3D shapes (cubes, cuboids, pyramids and spheres).

Year 3

Topic	Facts taught in this year group	Facts taught in previous year groups
Number and Place Value	<ul style="list-style-type: none"> • Count, from 0, in 3s to 36, 4s to 48 and 8s to 96. • Count in 50s and 100s. • Read and write numbers to 1,000 in numerals and words. • Know that there are 10 tens = 100. 	<ul style="list-style-type: none"> • Recognise odd and even numbers.
Addition and Subtraction		<ul style="list-style-type: none"> • Know number bonds to all numbers within 10. • Know number bonds to 10.
Multiplication and Division	<ul style="list-style-type: none"> • Know multiplication and division facts for the 3, 4 and 8 times tables. • Divide 10 by 2, 5 and 10 (to support reading scales). 	<ul style="list-style-type: none"> • Know multiplication and division facts for the 2, 5 and 10 times tables.
Fractions	<ul style="list-style-type: none"> • Count in 10ths. • Make a whole from fractions e.g. $\frac{2}{2}, \frac{3}{3}$ etc. 	
Measurement	<ul style="list-style-type: none"> • Know the number of seconds in a minute. • Know the number of days in each month. • Know the number of days in a year and a leap year. 	
Properties of Shapes		<ul style="list-style-type: none"> • Recognise and name 2D shapes (rectangles, squares, circles and triangles). • Recognise and name 3D shapes (cubes, cuboids, pyramids and spheres).

Year 4

Topic	Facts taught in this year group	Facts taught in previous year groups
Number and Place Value	<ul style="list-style-type: none"> • Count in 25s and 1,000s. • Know 10 hundreds = 1,000. 	<ul style="list-style-type: none"> • Recognise odd and even numbers.
Addition and Subtraction		<ul style="list-style-type: none"> • Know number bonds to all numbers within 10. • Know number bonds to 10.
Multiplication and Division	<ul style="list-style-type: none"> • Know multiplication and division facts for all times tables to 12 x 12. • Divide 1,000 by 2, 4, 5, 10 (to support reading scales). 	<ul style="list-style-type: none"> • Know multiplication and division facts for 2, 5, 10, 3, 4 and 8 times tables.
Fractions	<ul style="list-style-type: none"> • Count in 100ths. • Recognise and write decimal equivalents to $\frac{1}{10}$, $\frac{1}{100}$ and $\frac{1}{1000}$. 	
Measurement	<ul style="list-style-type: none"> • Know that: <ul style="list-style-type: none"> ➤ 1cm = 10mm ➤ 1m = 100cm ➤ 1km = 1000m ➤ 1kg = 1000g ➤ 1L = 1000ml • Know that: <ul style="list-style-type: none"> ➤ 1hr = 60 minutes ➤ 1 min = 60 seconds ➤ 1 year = 12 months ➤ 1 week = 7 days 	

Year 5

Topic	Facts taught in this year group	Facts taught in previous year groups
Number and Place Value	<ul style="list-style-type: none"> • Recognise odd and even numbers. • Know that: <ul style="list-style-type: none"> ➤ 10 tenths = 1 ➤ 100 hundredths = 1 ➤ 10 hundredths = 1 tenth 	
Addition and Subtraction		<ul style="list-style-type: none"> • Know number bonds to all numbers within 10. • Know number bonds to 10.
Multiplication and Division	<ul style="list-style-type: none"> • Know prime number to 19. • Know square numbers to 12². • Divide 1 by 2, 4, 5 and 10 (to support reading scales). 	<ul style="list-style-type: none"> • Know multiplication and division facts for all times tables to 12 x 12.
Fractions	<ul style="list-style-type: none"> • Know percentage and decimal equivalents to $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and fractions with denominators that are multiples of 10 and 25. 	
Measurement		<ul style="list-style-type: none"> • Know that: <ul style="list-style-type: none"> ➤ 1cm = 10mm ➤ 1m = 100cm ➤ 1km = 1000m ➤ 1kg = 1000g ➤ 1L = 1000ml • Know that: <ul style="list-style-type: none"> ➤ 1hr = 60 minutes ➤ 1 min = 60 seconds ➤ 1 year = 12 months ➤ 1 week = 7 days

Year 6

Topic	Facts taught in this year group	Facts taught in previous year groups
Number and Place Value		<ul style="list-style-type: none"> • Recognise odd and even numbers.
4 Operations	<ul style="list-style-type: none"> • Know the order of operations (BIDMAS). • Divide 1, 10, 100 and 1,000 by 2, 4, 5 and 10 (to support reading scales). 	<ul style="list-style-type: none"> • Know number bonds to all numbers within 10. • Know number bonds to 10. • Know multiplication and division facts for all times tables to 12 x 12. • Know prime number to 19. • Know square numbers to 12².
Fractions	<ul style="list-style-type: none"> • Know percentage and decimal equivalents to $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and fractions with denominators that are multiples of 10 and 25. 	
Measurement	<ul style="list-style-type: none"> • Know that: <ul style="list-style-type: none"> ➤ 8km = 5 miles 	<ul style="list-style-type: none"> • Know that: <ul style="list-style-type: none"> ➤ 1cm = 10mm ➤ 1m = 100cm ➤ 1km = 1000m ➤ 1kg = 1000g ➤ 1L = 1000ml • Know that: <ul style="list-style-type: none"> ➤ 1hr = 60 minutes ➤ 1 min = 60 seconds ➤ 1 year = 12 months ➤ 1 week = 7 days
Properties of Shapes	<ul style="list-style-type: none"> • Know the names of all parts of a circle (radius, diameter, and circumference). • Know that the diameter is double the radius. • Know that the radius is half the diameter. 	<ul style="list-style-type: none"> • Know that there are 360° in a full turn. • Know that there are 180° on a straight line.