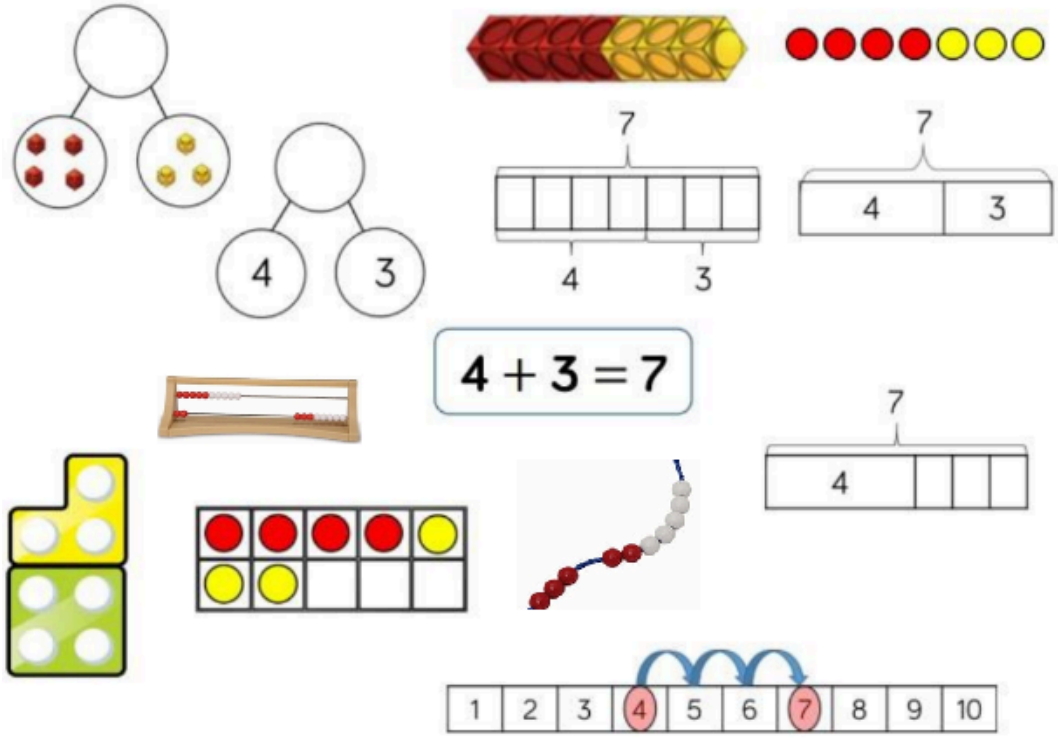
Maths Calculation Policy

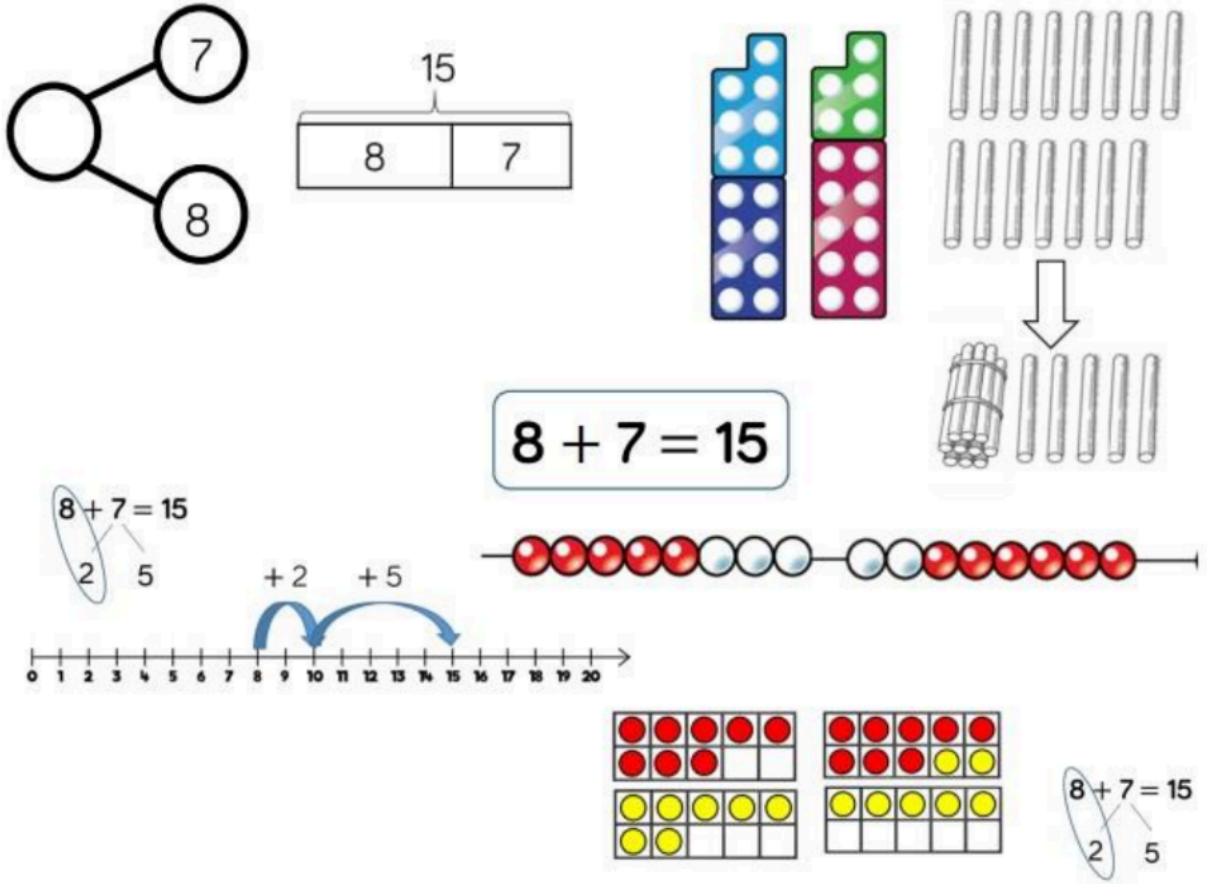
Thorn Grove Primary School

Approved by Governing Body on:	31 January 2024
L.Vose Headteacher	*T.Buckley* Chair of Governors
Next review due by:	January 2025

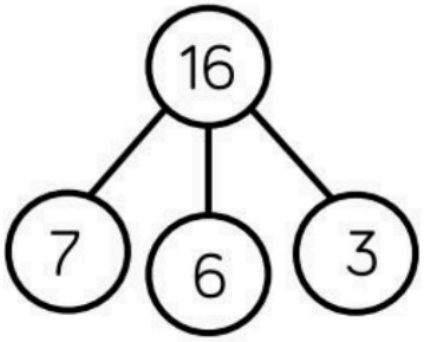
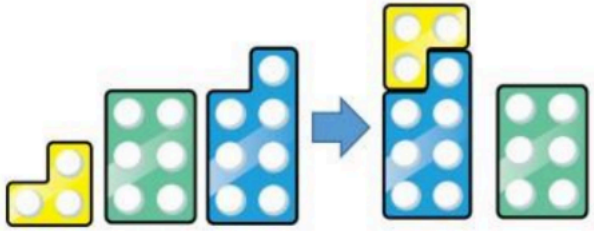
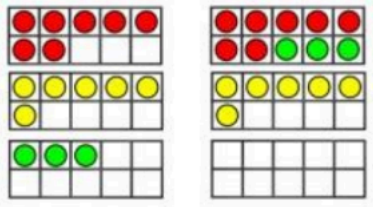
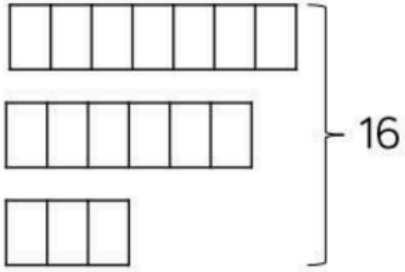
ADDITION

Skill: Add 1-digit numbers within 10	Year 1
	When adding numbers to 10, children can explore both aggregation and augmentation. The part-whole model, discrete and continuous bar model, number shapes and ten frame support aggregation. The combination bar model, ten frame, rekenrek and number track all support augmentation. **Key vocabulary:** **Aggregation** = combining two or more quantities or measures to find a total. **Augmentation** = increasing a quantity or measure by another quantity.

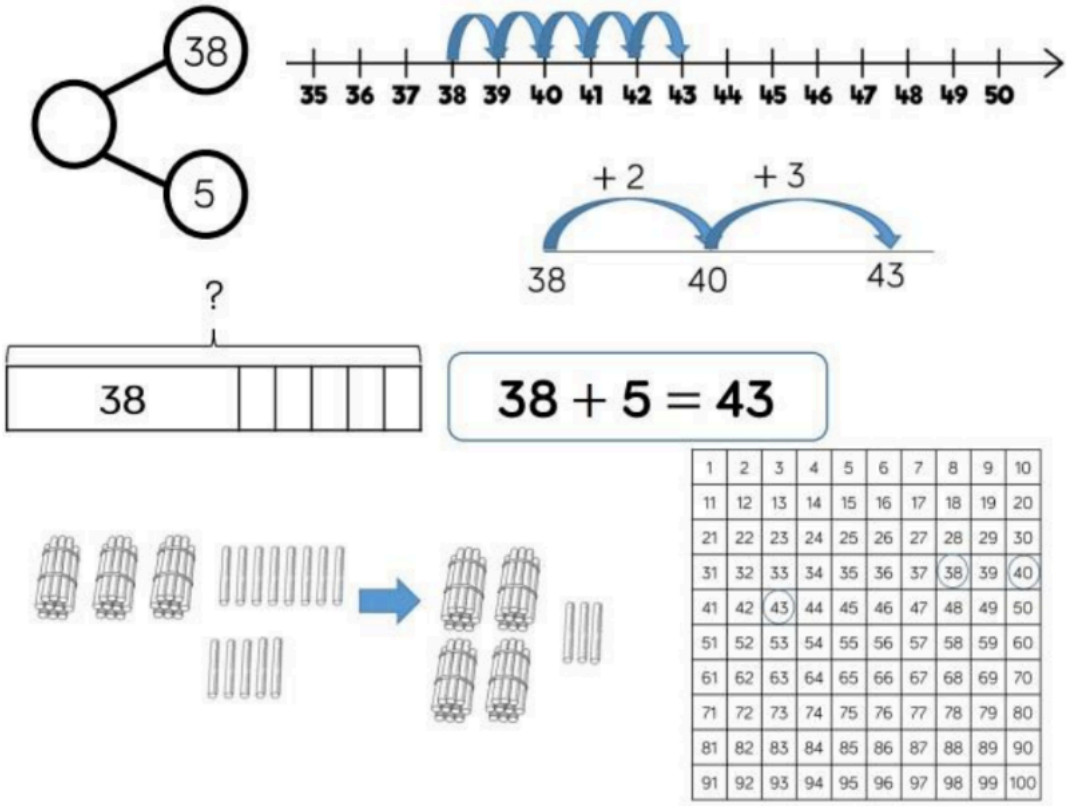
ADDITION

Skill: Add 1 and 2-digit numbers to 20	Year 1/2
	When adding one-digit numbers that cross 10, it is important to highlight the importance of tens ones equalling one ten. Different manipulatives can be used to represent this exchange. Use of concrete materials alongside number lines are used to support children's understanding in how to partition their jumps. **Key vocabulary:** **Exchange** = Change a number or expression for another of an equal value. **Partition** = splitting a number into its component parts.

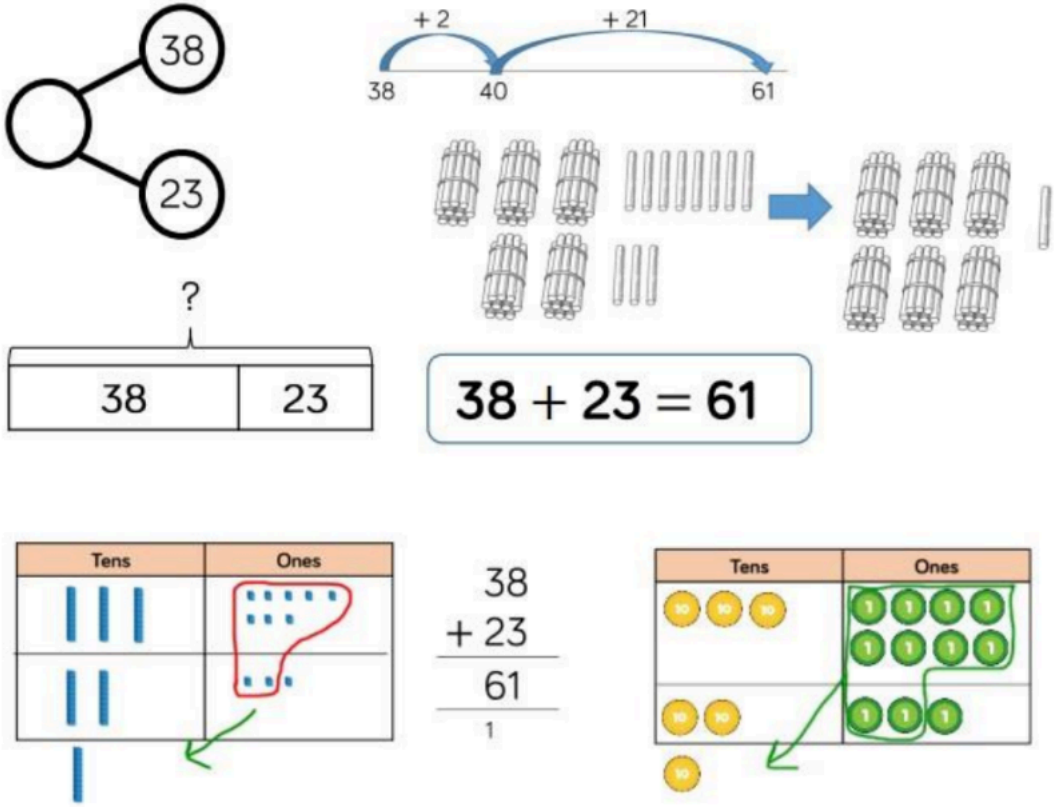
ADDITION

Skill: Add 3 1-digit numbers	Year 2
  $7 + 6 + 3 = 16$  7 + 6 + 3 = 16 10 	When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently. This supports children in their understanding of commutativity. Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers. **Key vocabulary:** **Commutativity** = numbers can be added in any order.

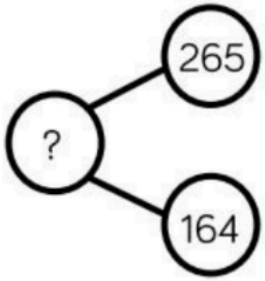
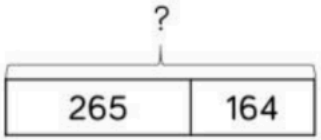
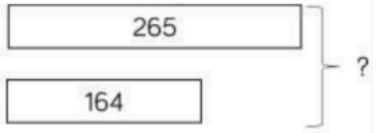
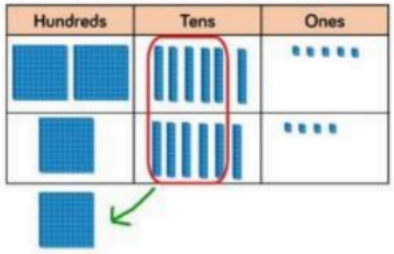
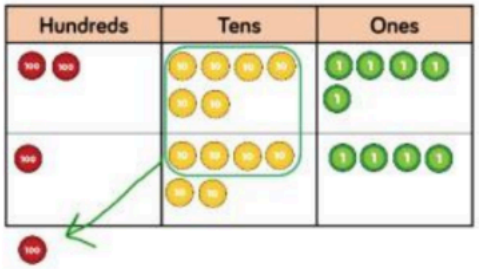
ADDITION

Skill: Add 1-digit and 2-digit numbers to 100	Year 2/3
	When adding single digits to a two-digit number, children should be encouraged to count on from the larger number. They should also apply their knowledge of number bonds to add more efficiently e.g. 8 + 5 = 13 so 38 + 5 = 43 Hundred squares and straws can support children to find the number bond to 10. **Key vocabulary:** **Sum** = the result of an addition **Total** = the aggregate or the sum found by addition

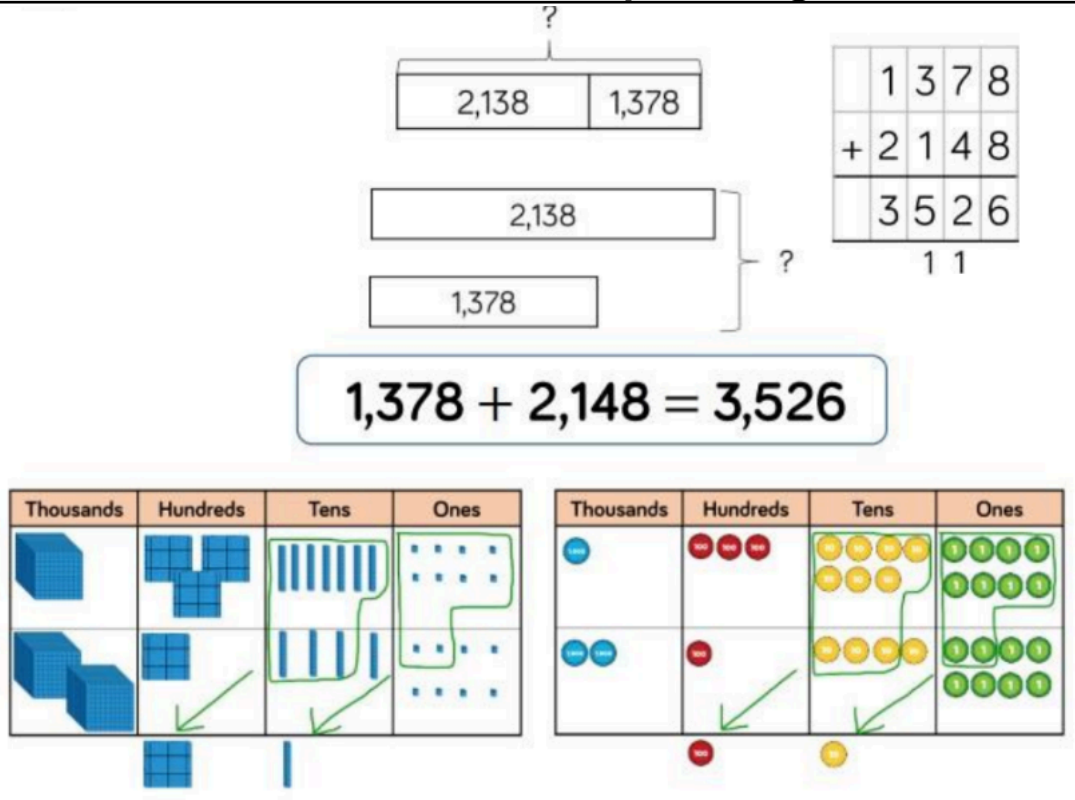
ADDITION

Skill: Add two 2-digit numbers to 100	Year 2/3
	At this stage, in Y3, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient. In Y2, children should be able to count on to find a total. Encourage them to jump to multiples of 10 to become more efficient. **Key vocabulary:** **Complement** = in addition, a number and its complement make a total e.g. 300 is the complement to 700 to make 1000.

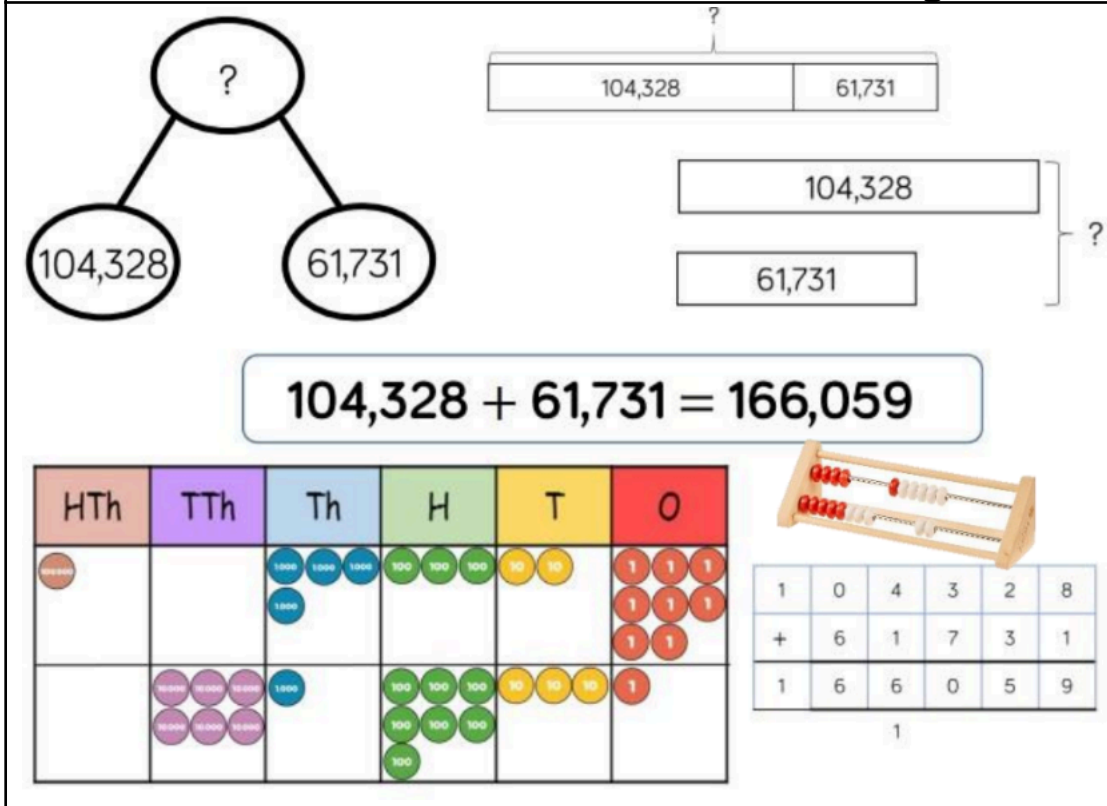
ADDITION

Skill: Add numbers up to 3 digits	Year 3
   $265 + 164 = 429$  265 + 164 429 1 	Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 3 digits. Ensure children write out their calculation alongside any concrete resources so they can see the links to the written method. Plain counters on a place value grid can also be used to support learning.

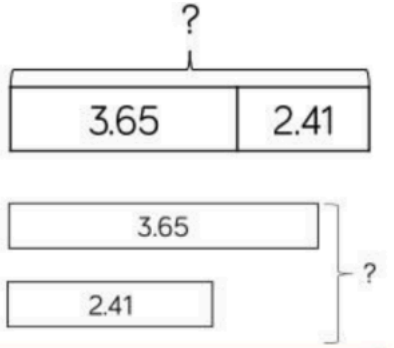
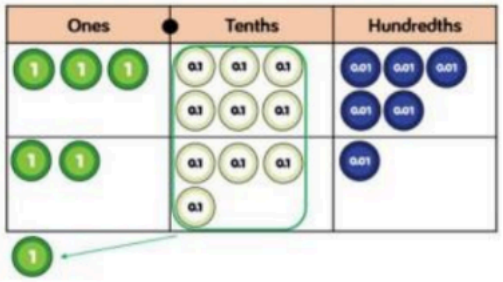
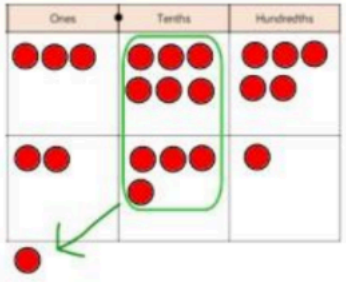
ADDITION

Skill: Add numbers up to 4 digits	Year 4
	Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 4 digits. The above is recommended along with ten frames. Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method. Plain counters on a place value grid can also be used to support learning.

ADDITION

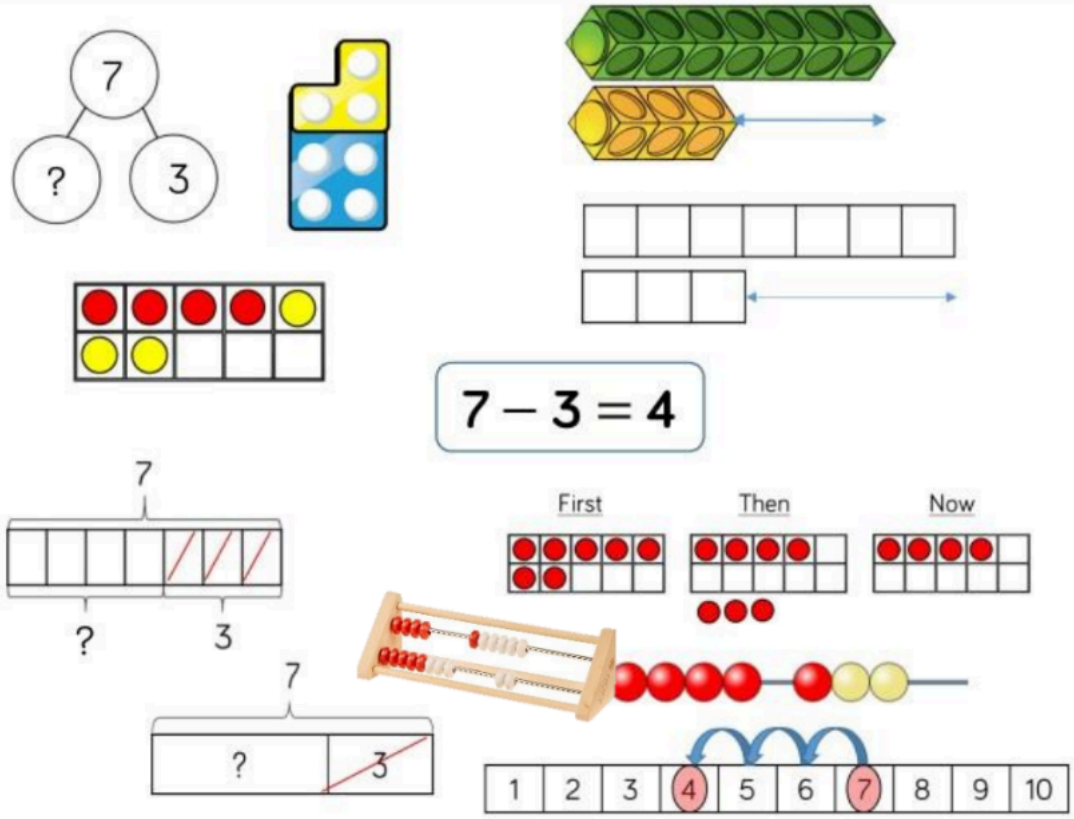
Skill: Add numbers with more than 4 digits	Year 5/6
	Place value counters or plain counters on a place value grid are the most effective concrete resources when adding numbers with more than 4 digits. All this stage, children should be encouraged to work in the abstract, using the column method to add larger numbers efficiently. **Key vocabulary:** **Addend** = a number to be added to another.

ADDITION

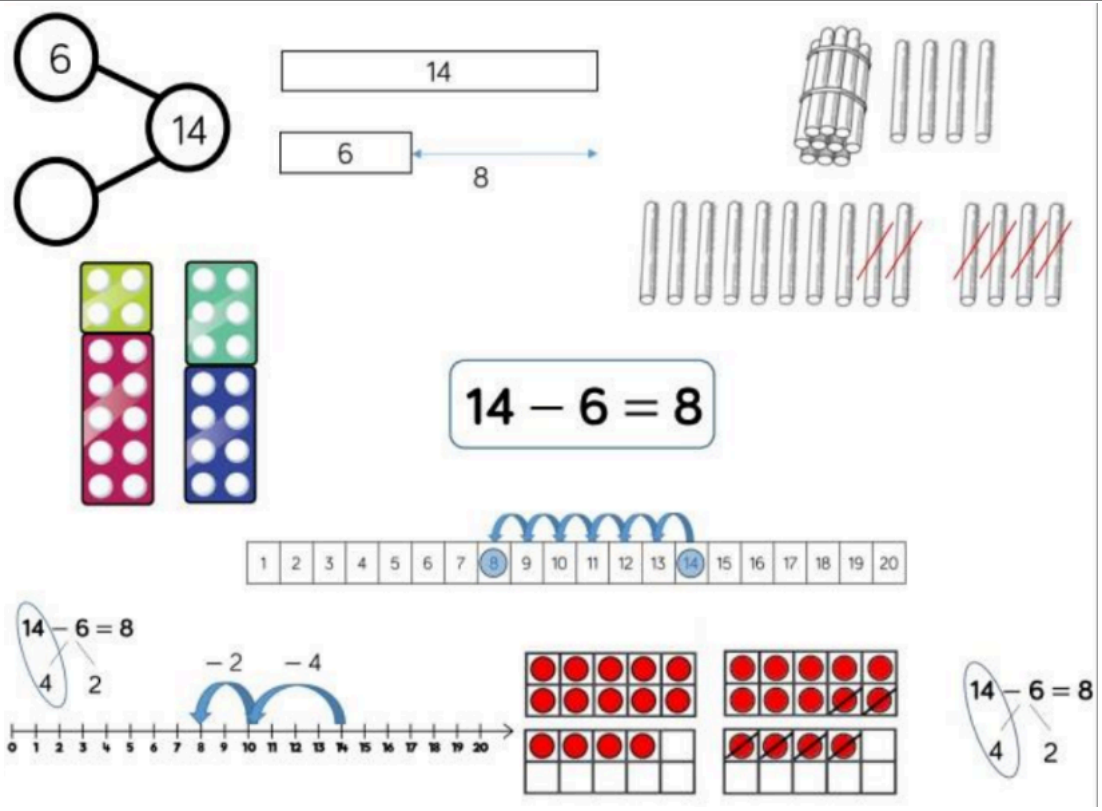
Skill: Add with up to 3 decimal places	Year 5
  3.65 + 2.41 = 6.06  	Place value counters and plain counters on a place value grid are the most effective manipulatives when adding decimals with 1, 2 and 3 decimal places. Ensure children have experience of adding decimals with a variety of decimal places. This includes putting this into context when adding money and other measures.

$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$$

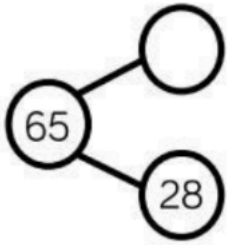
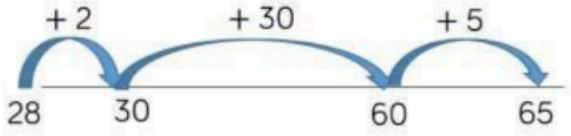
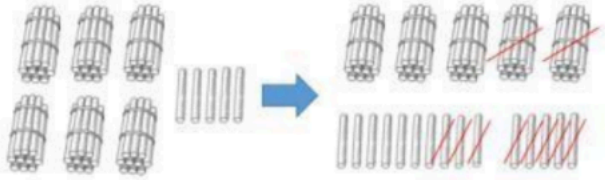
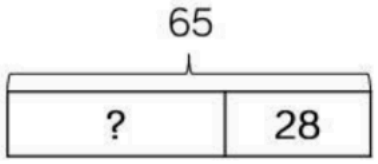
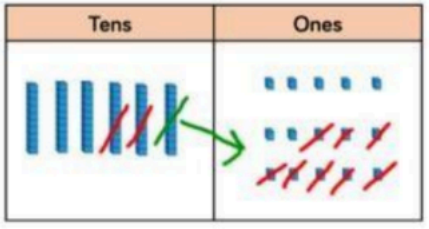
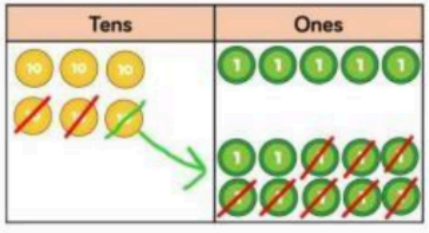
SUBTRACTION

Skill: Subtract 1-digit numbers within 10	Year 1
	Part whole models, bar models, tens frames and number shapes support partitioning. Tens frames, number tracks, single bar models and rekenreks support reduction. Cubes and bar models with two bars can support finding the difference. **Key vocabulary:** **Partitioning** = splitting a number into its component parts. **Reduction** = subtraction as take away.

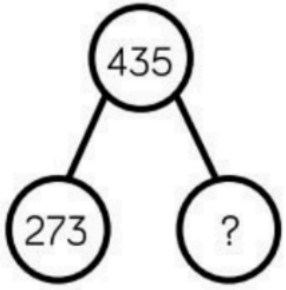
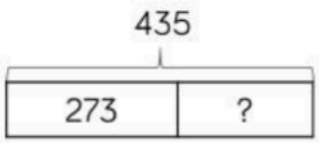
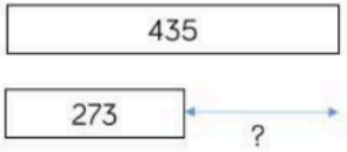
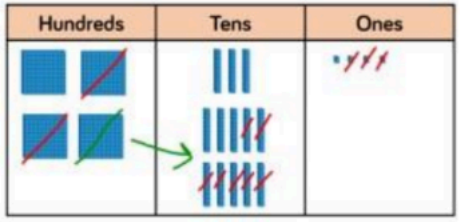
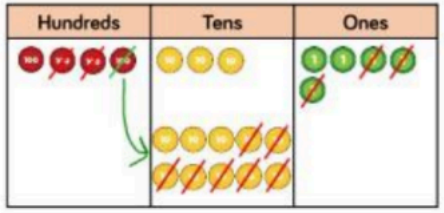
SUBTRACTION

Skill: Subtract 1 and 2-digit numbers to 20	Year 1/2
	When subtracting 1-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. Children should be encouraged to find the number bond to 10 when partitioning the subtracted number. Tens frames, Numicon and number lines are particularly useful for this. **Key vocabulary:** **Minuend =** a quantity or number from which another is subtracted.

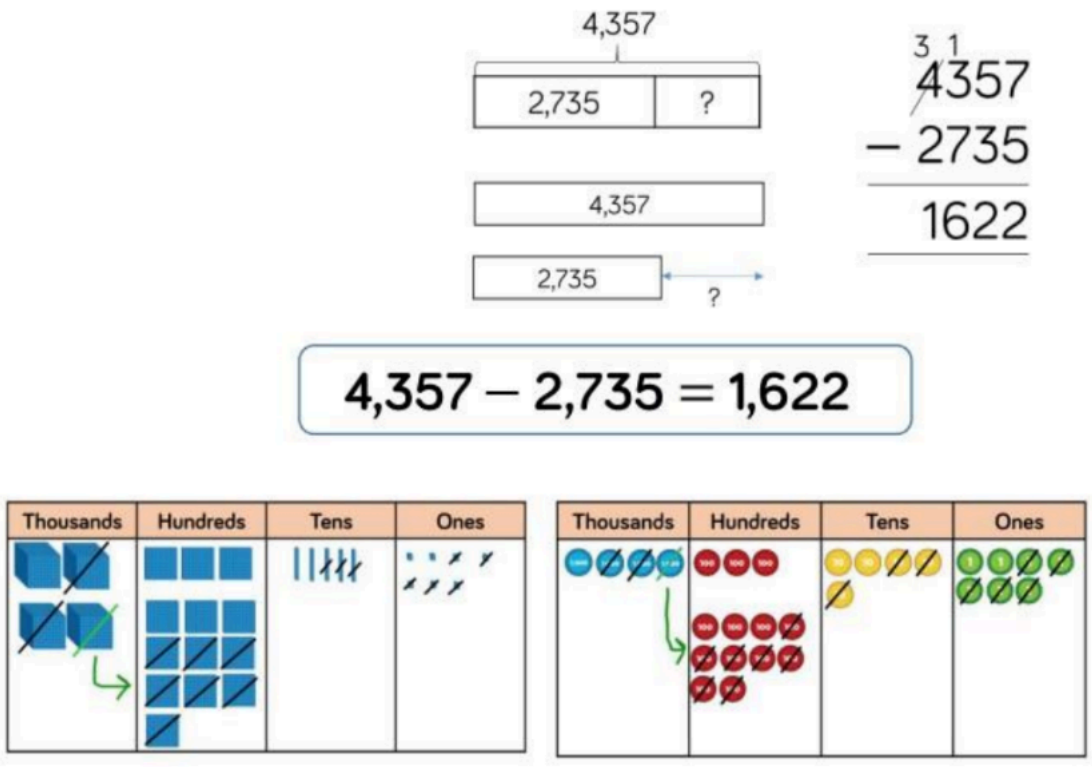
SUBTRACTION

Skill: Subtract 1 and 2-digit numbers to 100	Year 2
    $65 - 28 = 37$  	Children can also use a blank number line to count on to find the difference. Encourage them to jump to multiples of 10 to become more efficient.

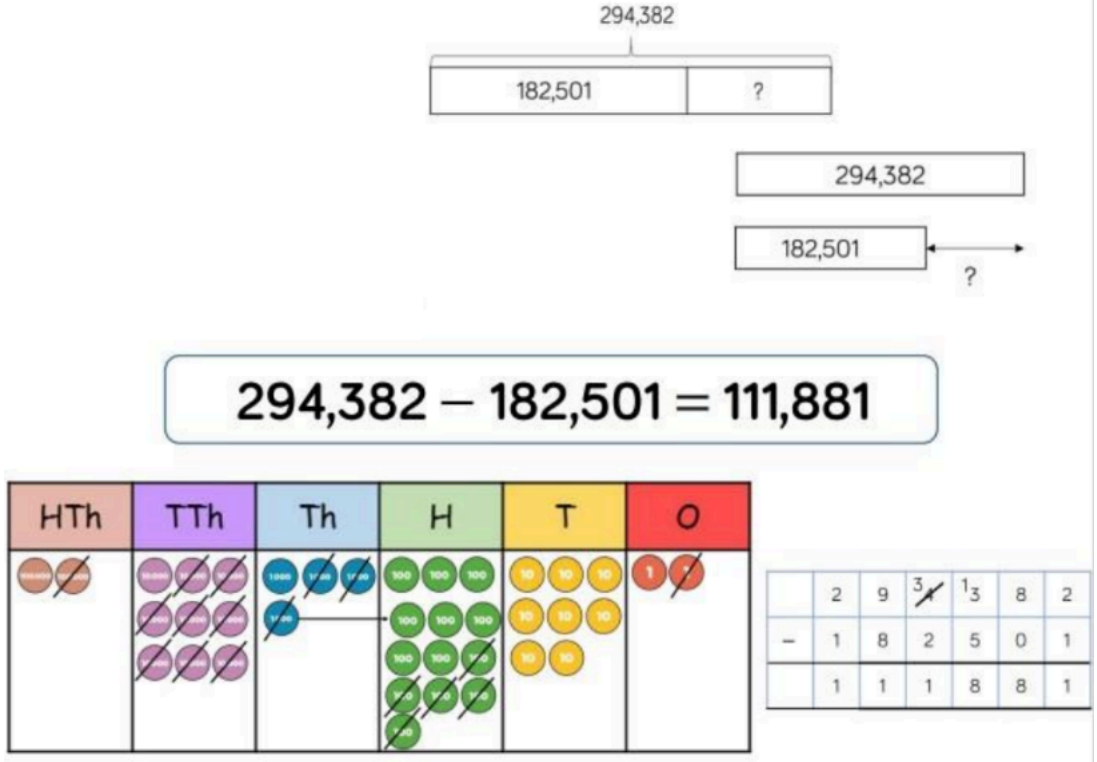
SUBTRACTION

Skill: Subtract numbers with up to 3-digits	Year 3
   435 − 273 = 262  3 1 435 − 273 262  Formal written method introduced in Year 3.	Base 10 and place value counters are the most effective manipulative when subtracting numbers with up to 3 digits. Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method. Plain counters on a place value grid can also be used to support learning.

SUBTRACTION

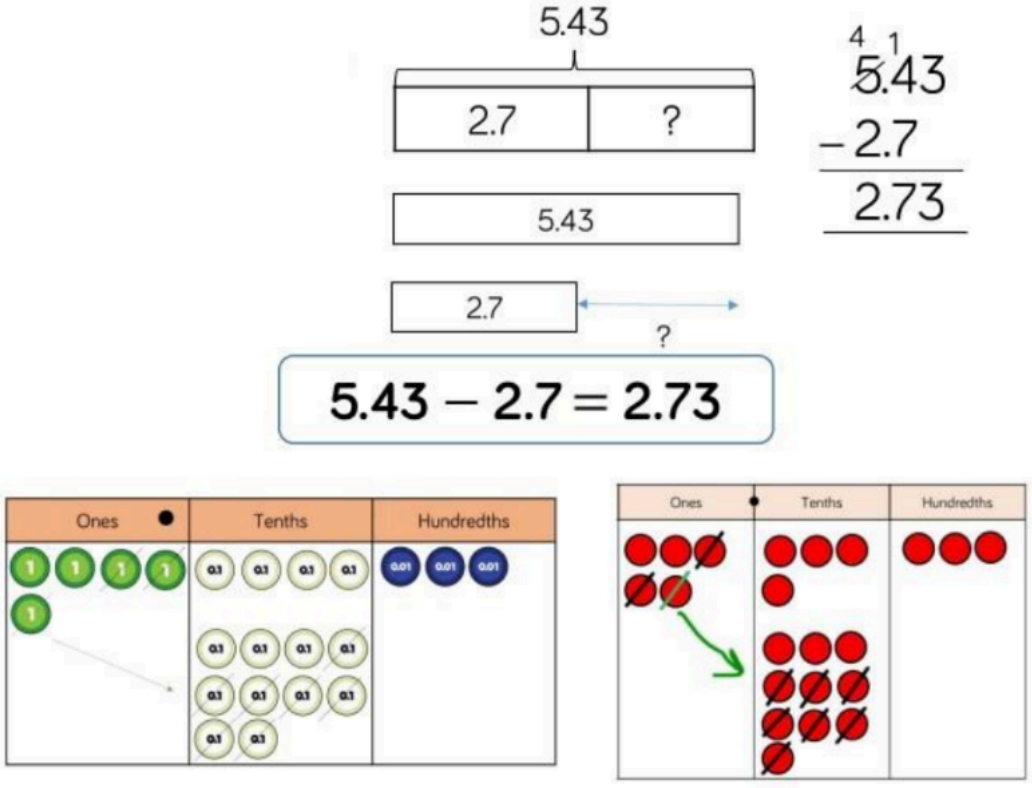
Skill: Subtract numbers with up to 4-digits	Year 4
	Base 10 and place value counters are the most effective manipulatives when subtracting numbers with up to 4 digits. Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method. Plain counters on a place value grid can also be used to support learning.

SUBTRACTION

Skill: Subtract numbers with more than 4-digits	Year 5/6
	Place value counters or plain counters on a place value grid are the most effective concrete resource when subtracting numbers with more than 4 digits. At this stage, children should be encouraged to work in the abstract, using column method to subtract larger numbers efficiently. **Key vocabulary:** **Subtrahend** = a number to be subtracted from another.

	2	9	$^{3}\not{4}$	$^{1}3$	8	2
−	1	8	2	5	0	1
	1	1	1	8	8	1

SUBTRACTION

Skill: Subtract with up to 3 decimal places	Year 5
	Place value counters and plain counters on a place value grid are the most effective manipulative when subtracting decimals with 1, 2 and 3 decimal places. Ensure children have experience of subtracting decimals with a variety of decimal places. This includes putting this into context when subtracting money and other measures.

MULTIPLICATION

Our calculation policy for multiplication starts with a breakdown of times tables; what should be taught when and what that teaching should look like.

During the Summer Term, the children in Year 4 sit the Multiplication Tables Check in line with the Government's assessment framework.

Times tables continue to be recalled and tested throughout Years 5 and 6 through a robust three-tiered system.

IDL's new multiplication strand should be used to aid in catch-up across KS2.

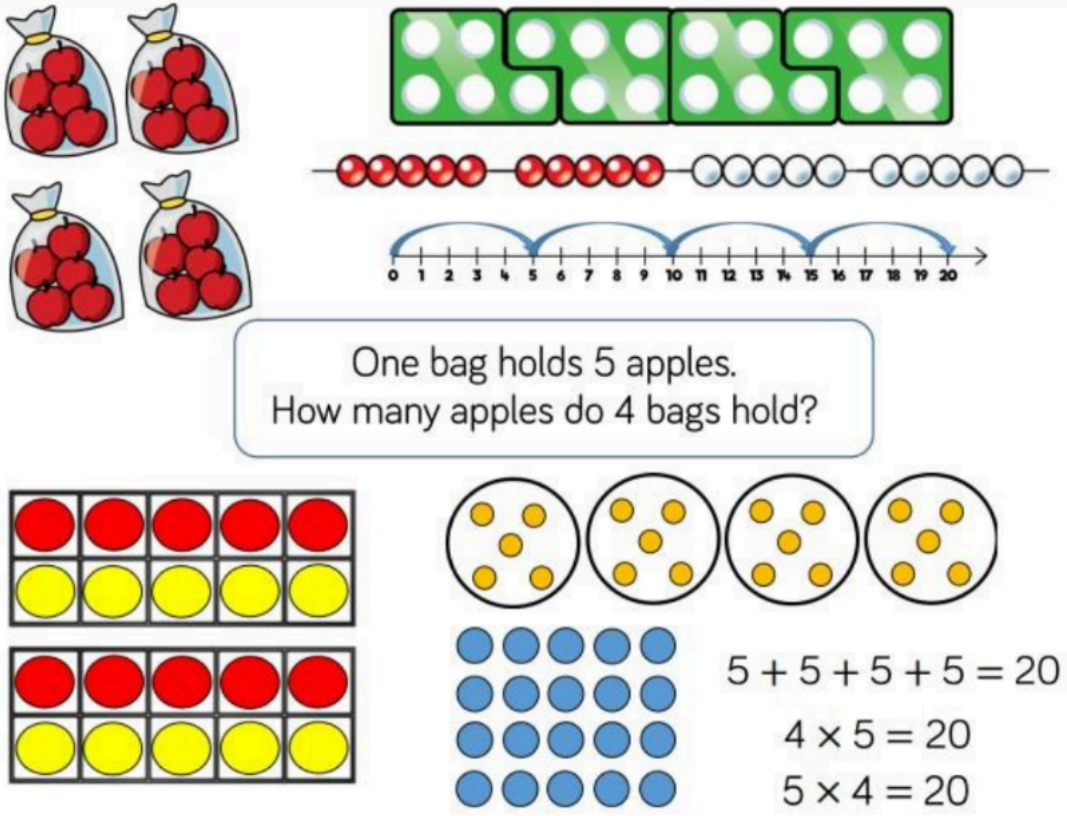
TT Rockstars forms part of children's in class early morning work/home learning.

Skill	Year	Representations and models	
Recall and use multiplication and division facts for the 2-times table	2	Bar model Number shapes Counters Money	Ten frames Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 5-times table	2	Bar model Number shapes Counters Money	Ten frames Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 10-times table	2	Hundred square Number shapes Counters Money	Ten frames Bead strings Number lines Base 10

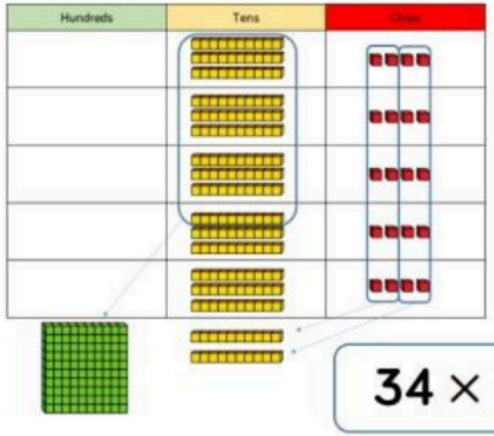
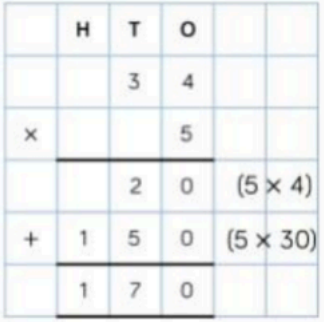
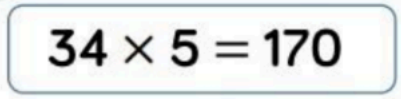
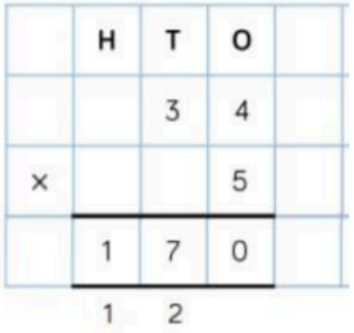
Skill	Year	Representations and models	
Recall and use multiplication and division facts for the 3-times table	3	Hundred square Number shapes Counters	Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 4-times table	3	Hundred square Number shapes Counters	Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 8-times table	3	Hundred square Number shapes	Bead strings Number tracks Everyday objects
Recall and use multiplication and division facts for the 6-times table	4	Hundred square Number shapes	Bead strings Number tracks Everyday objects

Skill	Year	Representations and models	
Recall and use multiplication and division facts for the 7-times table	4	Hundred square Number shapes	Bead strings Number lines
Recall and use multiplication and division facts for the 9-times table	4	Hundred square Number shapes	Bead strings Number lines
Recall and use multiplication and division facts for the 11-times table	4	Hundred square Base 10	Place value counters Number lines
Recall and use multiplication and division facts for the 12-times table	4	Hundred square Base 10	Place value counters Number lines

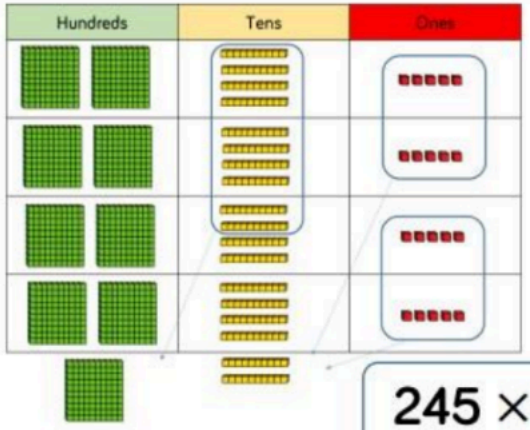
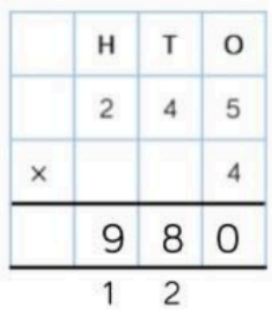
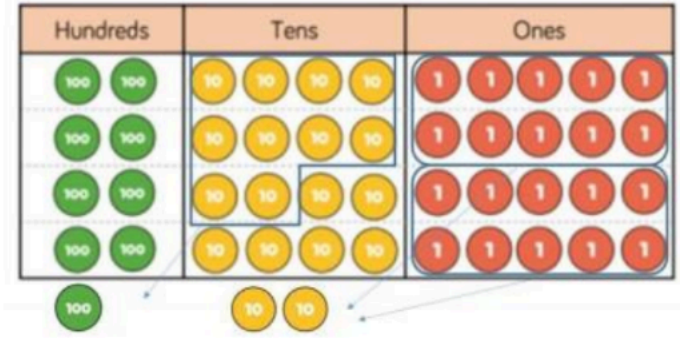
MULTIPLICATION

Skill: Solve 1-step problems using multiplication	Year 1/2
	Children represent multiplication as repeated addition in many different ways. In Y1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally. In Y2, children are introduced to the multiplication symbol. **Key vocabulary:** **Array** = an ordered collection of counters, cubes or items in rows and columns.

MULTIPLICATION

Skill: Multiply 2-digit numbers by 1-digit numbers	Year 3/4
    	Teachers may decide to first look at the expanded column method before moving on to the short multiplication method. The place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge. **Key vocabulary:** **Commutative** = numbers can be multiplied in any order. **Multiplicand** = a number multiplied by another.

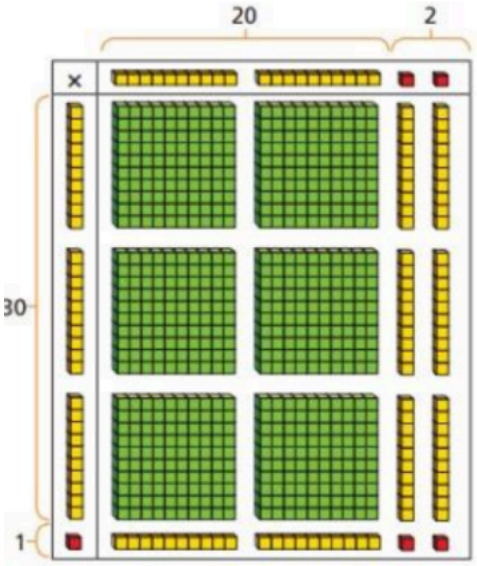
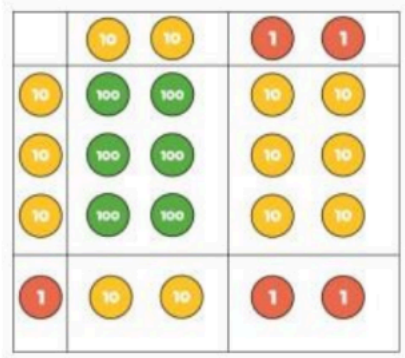
MULTIPLICATION

Skill: Multiply 3-digit numbers by 1-digit numbers	Year 3/4
  $245 \times 4 = 980$ 	When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short, formal written method. Base 10 and place value counters continue to support the understanding of the written method. Limit the number of exchanges needed in the questions and move children away from resources when multiplying larger numbers. **Key vocabulary:** **Product** = the result of multiplying one number by another. **Exchange** = change a number or expression for another of an equal value. (ten 1s for one 10)

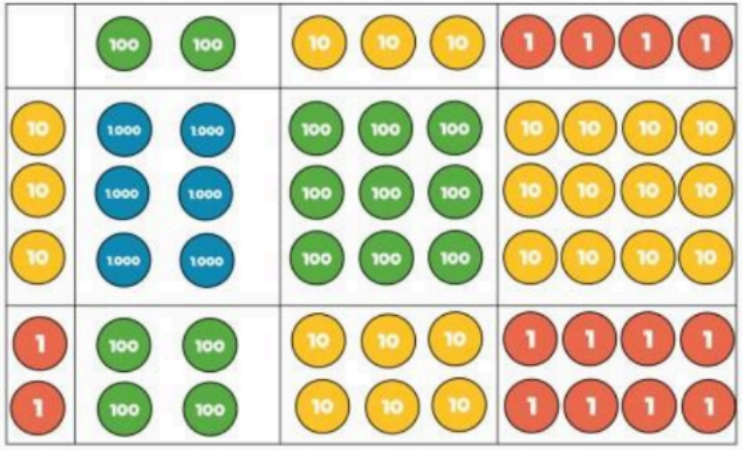
MULTIPLICATION

Skill: Multiply 4-digit numbers by 1-digit numbers	Year 5
 $1{,}826 \times 3 = 5{,}478$ | | Th | H | T | O | |---|---|---|---|---| | | 1 | 8 | 2 | 6 | | × | | | | 3 | | | 5 | 4 | 7 | 8 | | | 2 | | 1 | |	When multiplying 4-digit numbers, place value counters are the best manipulative to use to support children in their understanding of the formal written method. If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the method. **Key vocabulary:** **Factors** = a number that multiplies with another to make a product.

MULTIPLICATION

Skill: Multiplying 2-digit numbers by 2-digit numbers	Year 5
  | × | 20 | 2 | |---|---|---| | 30 | 600 | 60 | | 1 | 20 | 2 | | | H | T | O | |---|---|---|---| | | | 2 | 2 | | × | | 3 | 1 | | | | 2 | 2 | | | 6 | 6 | 0 | | | 6 | 8 | 2 | $22 \times 31 = 682$	When multiplying a multi-digit number by 2-digits, use the area model to help children to understand the size of the numbers they are using. This links to finding the area of a rectangle by finding the space covered by Base 10. The grid method matches the area model as an initial written method before moving on to the formal written multiplication method.

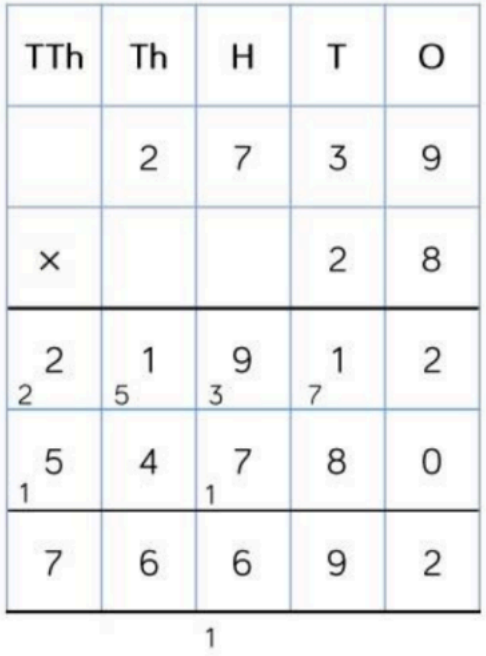
MULTIPLICATION

Skill: Multiply 3-digit numbers by 2-digit numbers	Year 5
 234 × 32 = 7,488	Children can continue to use the area model when multiplying 3-digits by 2-digits. Place value counters become more efficient to use but Base 10 can be used to highlight the size of the numbers. Encourage children to move towards the formal written method seeing the links with the grid method.

Th	H	T	O
	2	3	4
×		3	2
	4	6	8
$^{1}7$	$^{1}0$	2	0
7	4	8	8

×	200	30	4
30	6,000	900	120
2	400	60	8

MULTIPLICATION

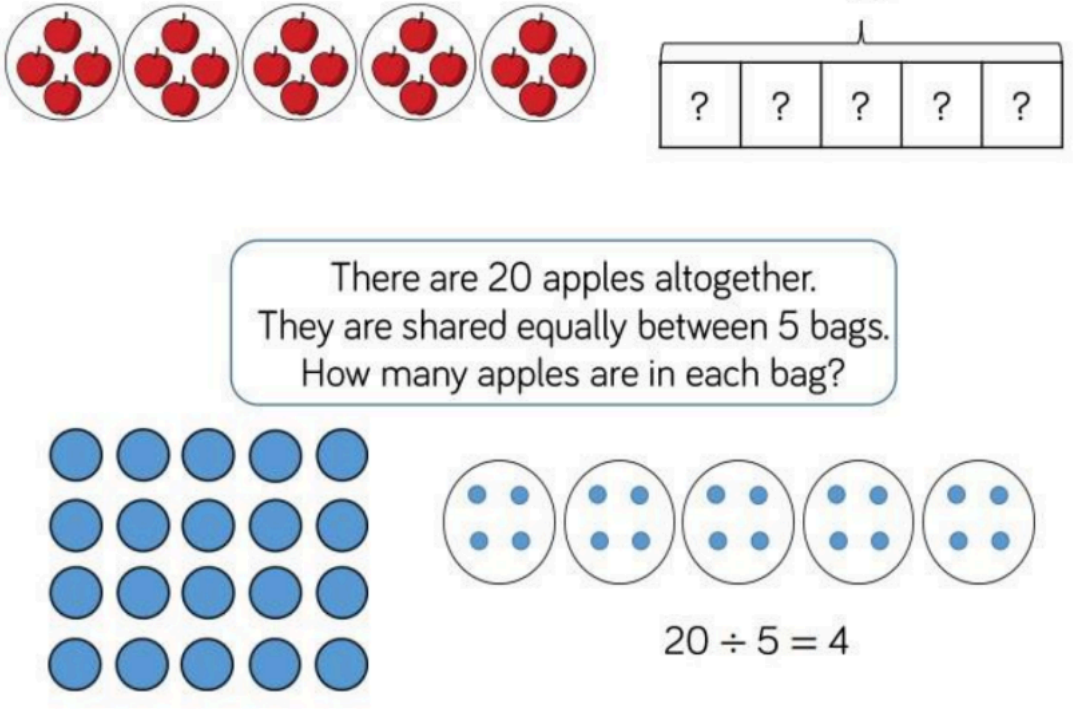
Skill: Multiply 4-digit numbers by 2-digit numbers	Year 5/6
 $2{,}739 \times 28 = 76{,}692$	When multiplying 4-digits by 2-digits, children should be confident in the written method. If they are still struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method. Consider where exchanged digits are placed and make sure this is consistent.

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

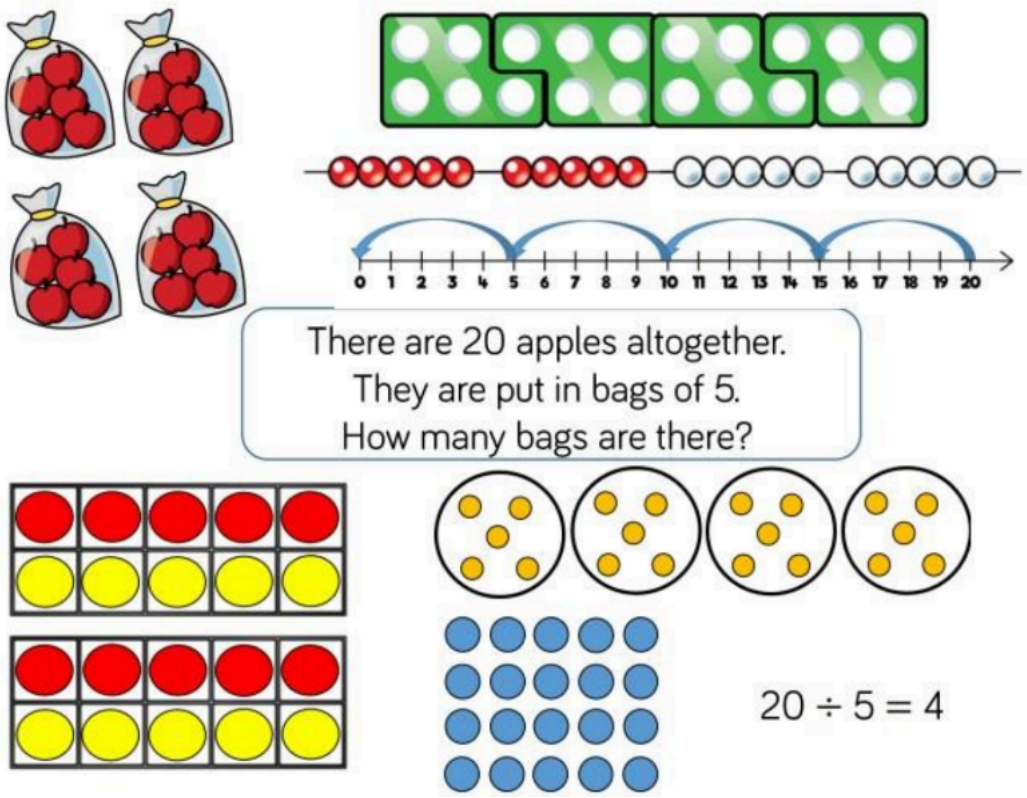
Factors are orange

Multiples are white

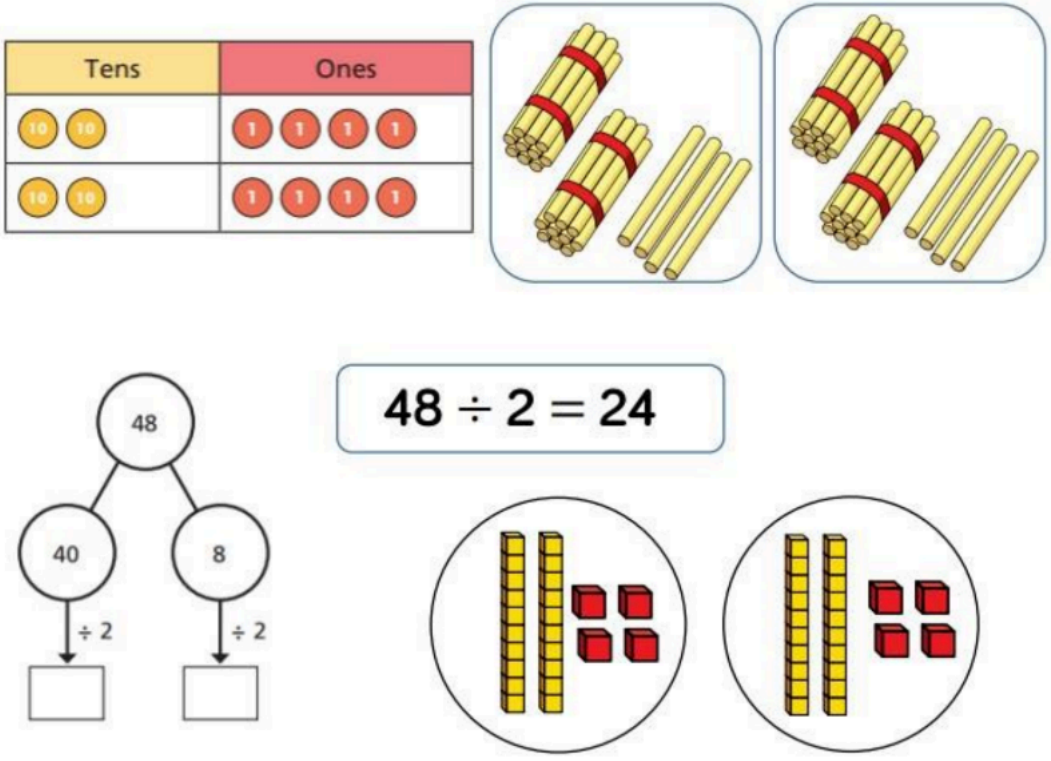
DIVISION

Skill: Solve 1-step problems using multiplication (sharing)	Year
	Children solve problems by sharing amounts into equal groups. In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally. In Year 2, children are introduced to the division symbol.

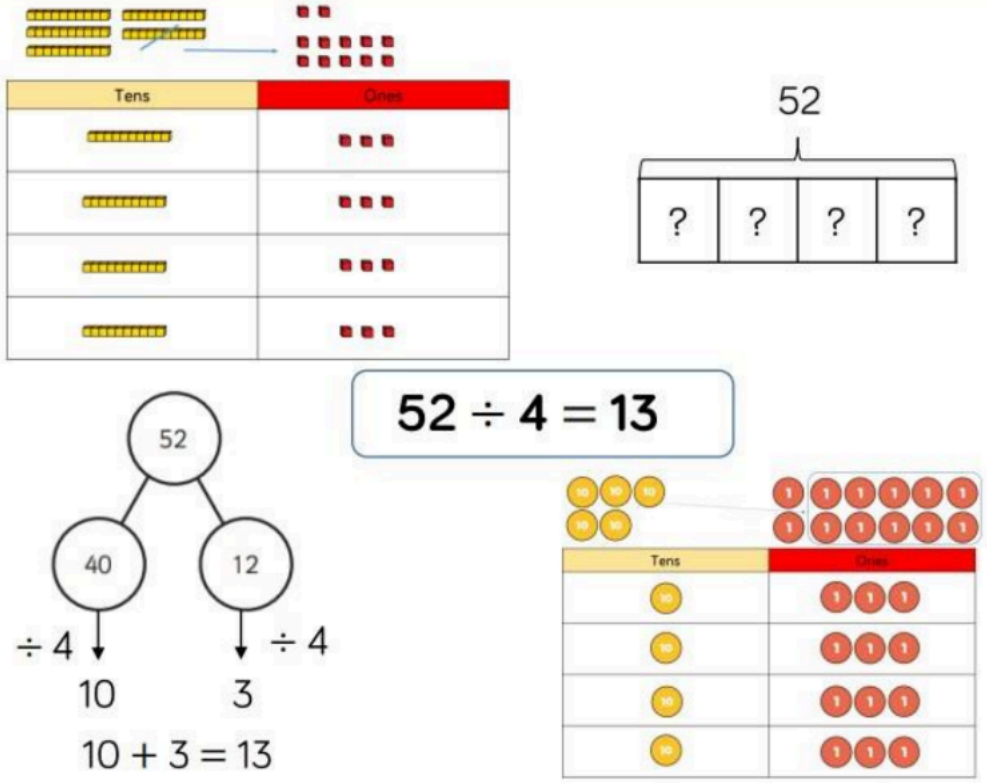
DIVISION

Skill: Solve 1-step problems using division (grouping)	Year 1/2
	Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.

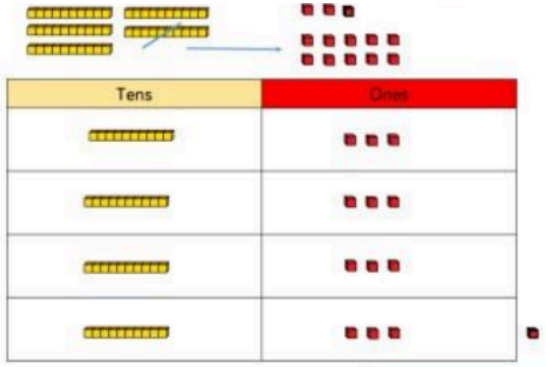
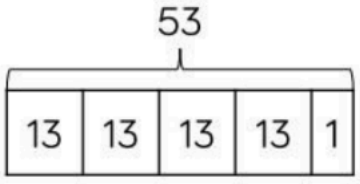
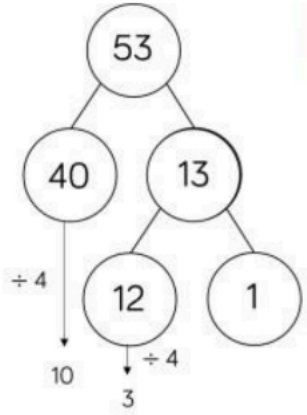
DIVISION

Skill: Divide 2-digits by 1-digit (sharing with no exchange)	Year 1/2
	When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones. Straws, Base 10 and place value counters can all be used to share numbers into equal groups. Part-whole models can provide children with a clear written method that matches the concrete representation.

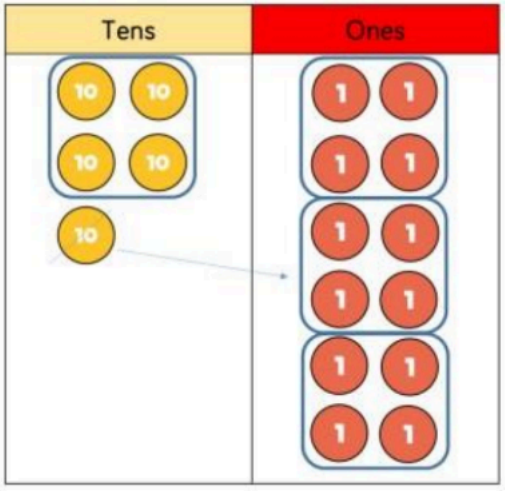
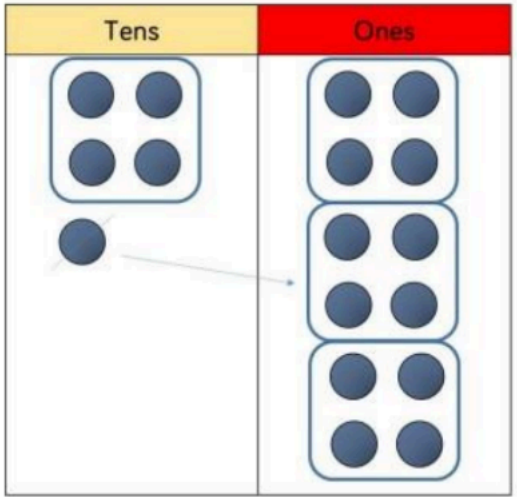
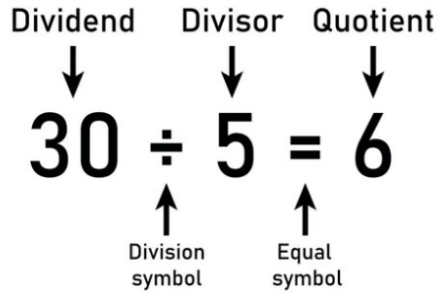
DIVISION

Skill: Divide 2-digits by 1-digit (sharing with exchange)	Year 3/4
	When dividing numbers involving an exchange, children can use Base 10 and place value counters to exchange one ten for ten ones. Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows. Flexible partitioning in a part-whole model supports this method. **Key vocabulary:** **Partitioning** = splitting a number into its component parts.

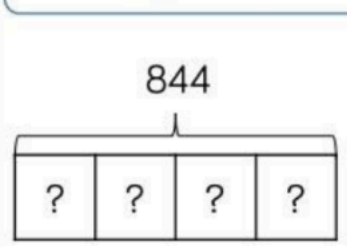
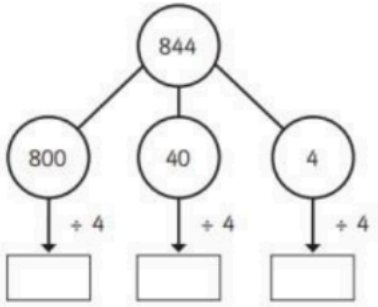
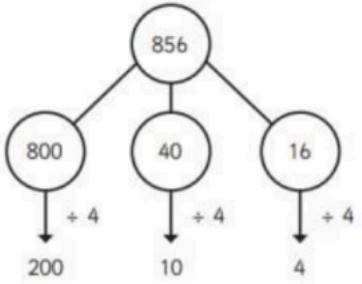
DIVISION

Skill: Dividing 2-digits by 1-digit (sharing with remainders)	Year 3/4
   $53 \div 4 = 13\ r1$	When dividing numbers with remainders, children can use Base 10 and place value counters to exchange one ten for ten ones. Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made. Flexible partitioning a part-whole model supports this method.

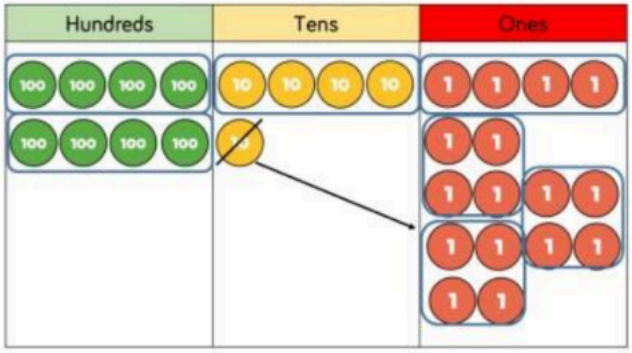
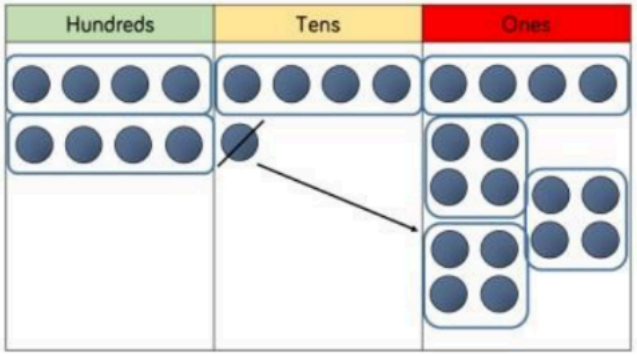
DIVISION

Skill: Divide 2-digits by 1-digit (grouping)	Year 4/5
   $52 \div 4 = 13$	When using the short division method, children use grouping. Starting with the largest place value, they group by the divisor. Language is important here. Children should consider 'how many groups of 4 tens can we make?' and 'how many groups of 4 ones can we make?' Remainders can also be seen as they are left ungrouped. **Key vocabulary:**  **Dividend** = the number that is divided. **Divisor** = the number by which another is divided. **Quotient** = the result of a division.

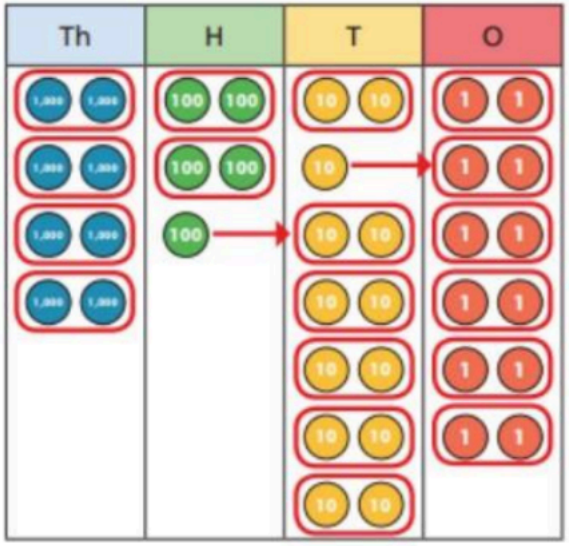
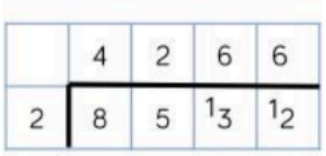
DIVISION

Skill: Divide 3-digits by 1-digit (sharing)	Year 4
844 ÷ 4 = 211    **844 ÷ 4 = 211** 	Flexible partitioning in a part-whole model supports this method.

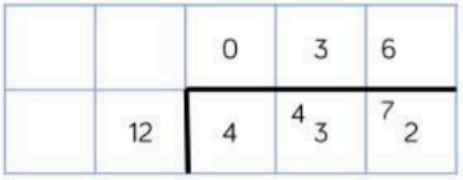
DIVISION

kill: Divide 3-digits by 1-digit (grouping)	Year 5
   856 ÷ 4 = 214	Children can continue to use grouping to support their understanding of short division when dividing a 3-digit number by a 1-digit number. Place value counters or plain counters can be used on a place value grid to support this understanding. Children can also draw their own counters and group them through a more pictorial method.

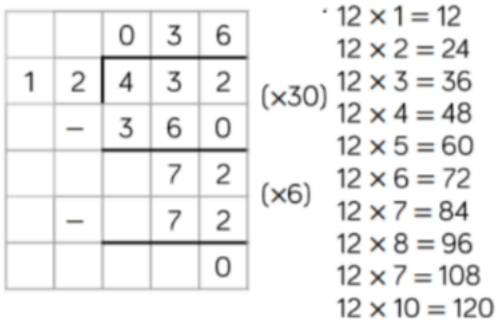
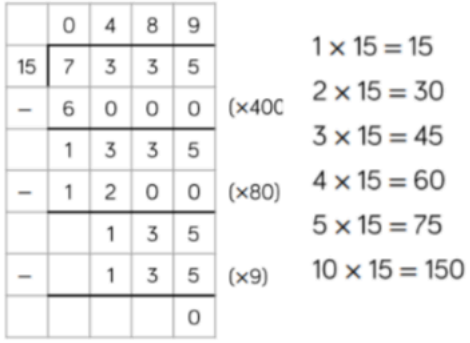
DIVISION

Skill: Divide 4-digits by 1-digit (grouping)	Year 5
  8,532 ÷ 2 = 4,266	Place value counters or plain counters can be used on a place value grid to support children to divide 4-digits by 1-digit. Children can also draw their own counters and group them through a more pictorial method. Children should be encouraged to move away from the concrete and pictorial when dividing numbers with multiple exchanges.

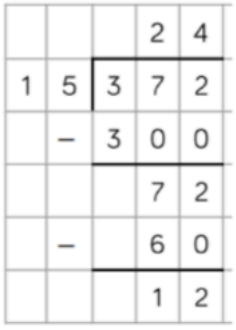
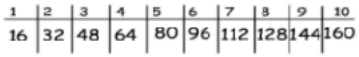
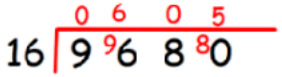
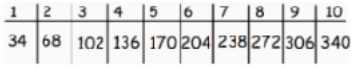
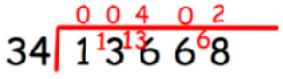
DIVISION

Skill: Divide multi-digits by 2-digits (short division)	Year 6
 $432 \div 12 = 36$ $7{,}335 \div 15 = 489$   	When children begin to divide up to 4-digits by 2-digits, written methods become the most accurate as concrete and pictorial representations become less effective. Children can write out multiples to support their calculations with larger remainders. Children will also solve problems with remainders where the quotient can be rounded as appropriate. **Key vocabulary:** **Remainder** = the amount left over after a division where the divisor is not a factor of the dividend.

DIVISION

Skill: Divide multi-digits by 2-digits (long division)	Year 6
 12 × 1 = 12 12 × 2 = 24 12 × 3 = 36 12 × 4 = 48 12 × 5 = 60 12 × 6 = 72 12 × 7 = 84 12 × 8 = 96 12 × 7 = 108 12 × 10 = 120 **432 ÷ 12 = 36** **7,335 ÷ 15 = 489**  1 × 15 = 15 2 × 15 = 30 3 × 15 = 45 4 × 15 = 60 5 × 15 = 75 10 × 15 = 150	Children can also divide by 2-digit numbers using long division. Children can write out multiples to support their calculations with larger remainders. Children will also solve problems with remainders where the quotient can be rounded as appropriate.

DIVISION

Skill: Divide multi digits by 2-digits (long division)	Year 6
$372 \div 15 = 24\ r12$ $372 \div 15 = 24\frac{4}{5}$   $1 \times 15 = 15$ $2 \times 15 = 30$ $3 \times 15 = 45$ $4 \times 15 = 60$ $5 \times 15 = 75$ $10 \times 15 = 150$ 9,680 ÷ 16 =   13,668 ÷ 34 =  	When a remainder is left at the end of a calculation, children can either leave it is a remainder it convert it to a fraction. This will depend on the context of the question. Children can also answer questions where the quotient needs to be rounded according to the context.