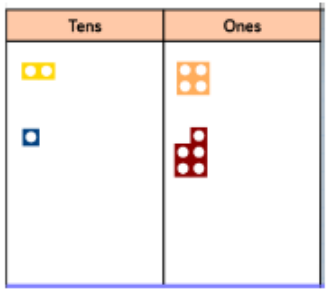
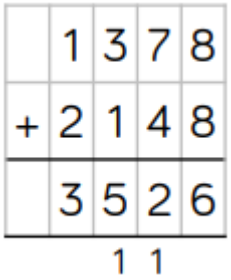
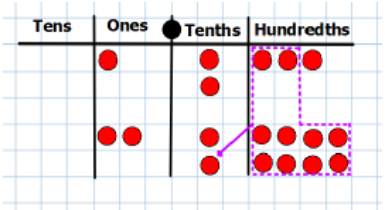
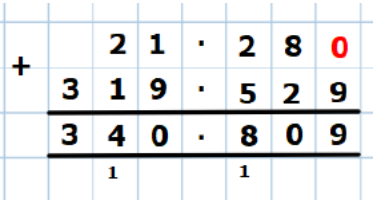
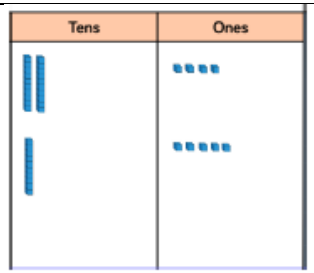
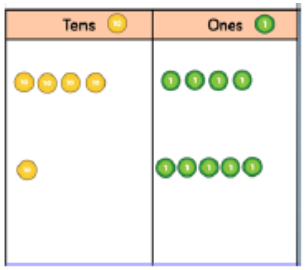
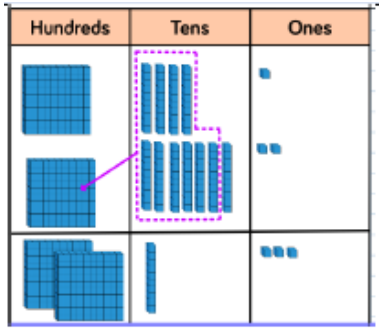
Anton Junior School Progression in Calculation

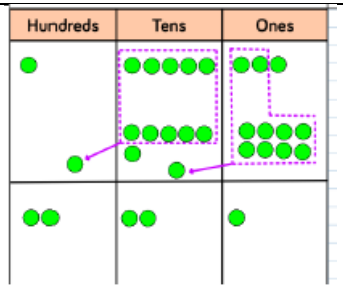
Addition

End of year expectations	Year 3	Year 4	Year 5	Year 6
	Add numbers with up to 3 digits using the formal written methods of columnar addition.	Add numbers with up to 4 digits using the formal written methods of columnar addition.	Add whole numbers with more than 4 digits, including using formal written methods (columnar addition).	Solve addition and subtraction multi-step problems in contexts, deciding on which operations and methods to use and why.
Developing written methods (conceptual understanding). Children should also understand that addition can be done in any order.  Bar model to help link addition and subtraction.	Without carrying: Using Numicon, model place value and adding without carrying. Model adding from right to left (ones, tens, hundreds, etc.)  Using Dienes and then place value counters, model place value and adding without carrying.	Secure Year 3 methods. Moving on to securing formal column method for up to 4 digits.  Model lining up the digits when numbers have different number of digits. Moving onto adding more than two numbers using the formal written method. Estimations should be taught in Year 4.	Secure formal written method for larger numbers and with decimals in context. (Dienes or place value counters can support here)  Model how to line the digits up correctly. £1.75 + £2.36 £4.11 1 1	Use formal written method for large numbers, different sized numbers and decimals in different contexts. Model inserting zeros as place holders.  237.400 + 6.351 0.920 244.671 1 1

Anton Junior School Progression in Calculation

	  With carrying: Model how to carry/exchange using Dienes and place value counters (10 ones for a ten and 10 tens for a hundred). 			

Anton Junior School Progression in Calculation



Expanded method using partitioning:

2	0	+	5				
4	0	+	8				
6	0	+	1	3	=	7	3

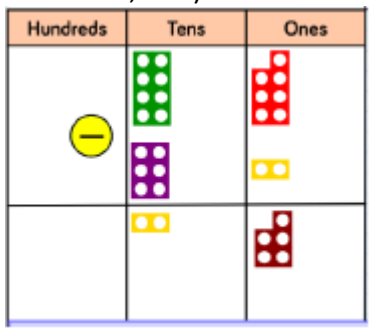
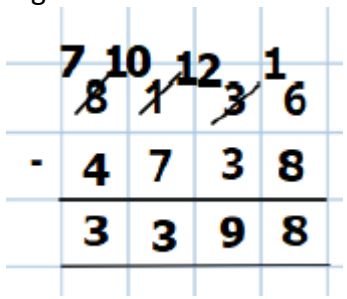
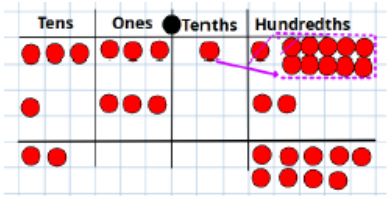
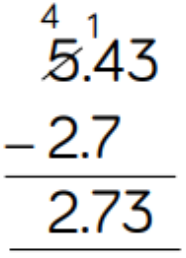
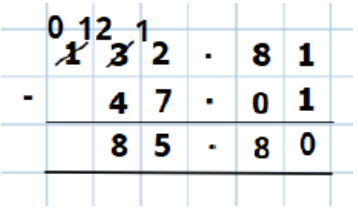
Then with carry/exchange:

$$\begin{array}{r} 40 + 6 \\ \underline{20 + 7} \\ \underline{70 + 3} \\ 10 \end{array} = 73$$

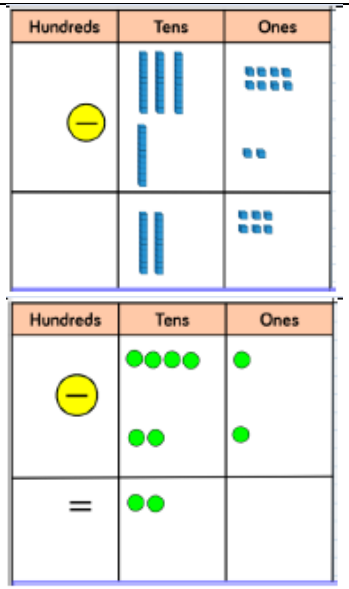
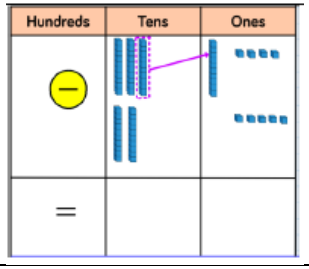
Finally model formal column addition demonstrating carrying/exchanging for up to 3 digits:

$$\begin{array}{r} \ 2\ 5 \\ +\ 4\ 8 \\ \hline \ 7\ 3 \\ \hline \ 1 \end{array}$$

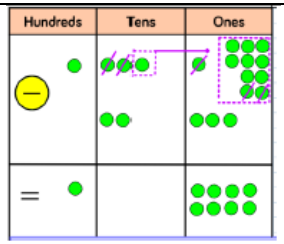
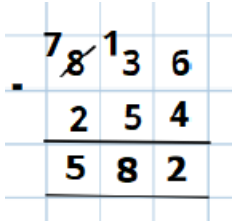
Anton Junior School Progression in Calculation

Subtraction				
End of year expectations	**Year 3** Subtract numbers with up to 3 digits using the formal written methods of columnar subtraction.	**Year 4** Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction.	**Year 5** Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction).	**Year 6** Solve addition and subtraction multi-step problems in contexts, deciding on which operations and methods to use and why.
Developing written methods (conceptual understanding).  Bar model to help link addition and subtraction.	Without exchanging Using Numicon, model place value and subtracting without carrying. Model subtracting from right to left (ones, tens, hundreds, etc.)  Using Dienes and then place value counters, model place value and adding without carrying.	Secure Year 3 methods. Moving on to securing formal column method for up to 4 digits.  Model lining up the digits when numbers have different number of digits. Children also need to be taught how to exchange when there are zeros. Estimations should be taught in Year 4.	Secure formal written method for larger numbers and with decimals in context. (Dienes or place value counters can support here)  Model how to line the digits up correctly.  	Use formal written method for large numbers, different sized numbers and decimals in different contexts. Model inserting zeros as place holders. 

Anton Junior School Progression in Calculation

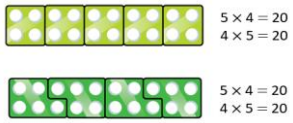
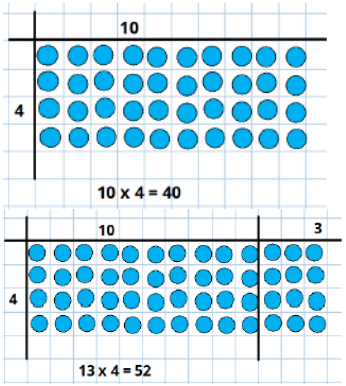
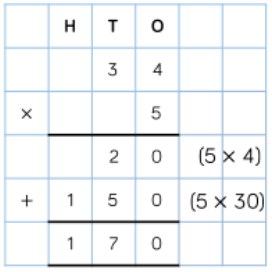
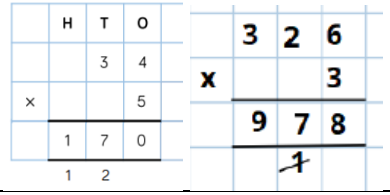
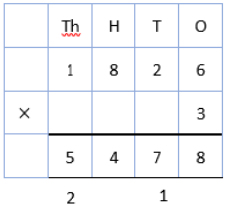
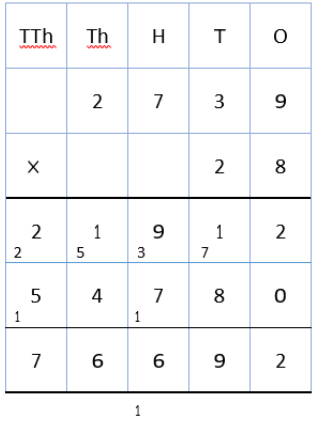
	 With exchanging: Model how to exchange using Dienes and place value counters (10 ones for a ten and 10 tens for a hundred). 	Using inverse operations to check answers.		

Anton Junior School Progression in Calculation

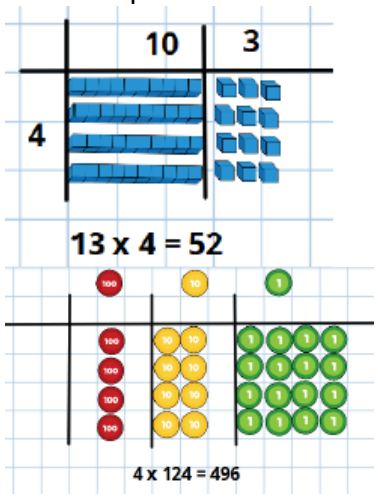
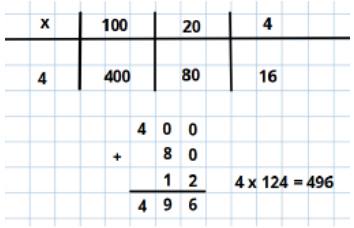
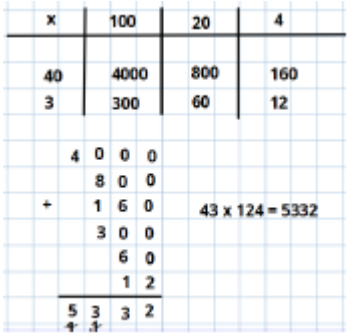
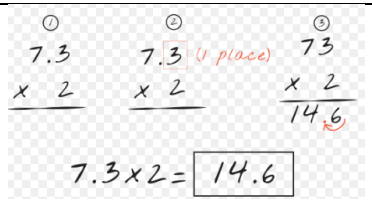
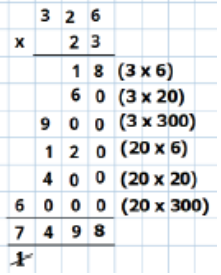
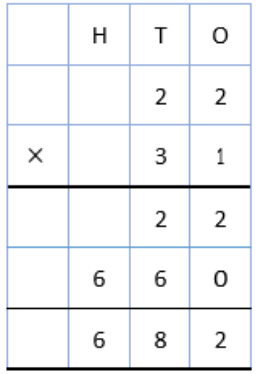
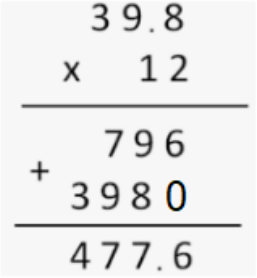
	 Expanded method using partitioning: 40 6 - 20 2 20 4 = 24 Then with exchange: $^{30}\not{4}0$ $^{1}6$ 20 7 10 9 = 19 Finally model formal column subtraction demonstrating exchanging for up to 3 digits: 			

Anton Junior School Progression in Calculation

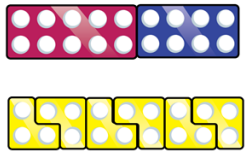
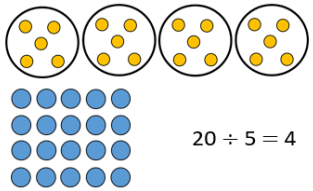
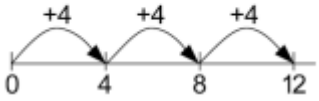
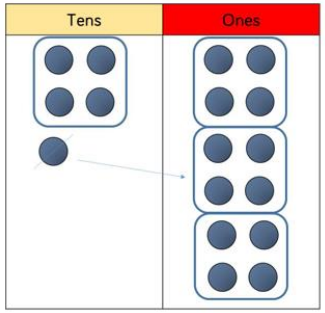
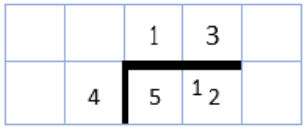
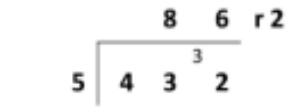
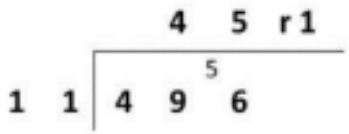
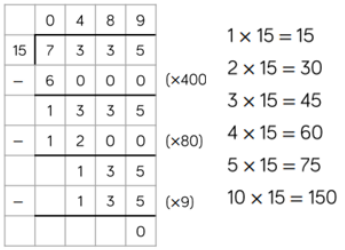
Multiplication

	Year 3	Year 4	Year 5	Year 6
End of year expectations	Write and calculate mathematical statements for multiplication using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.	Multiply two-digit and three-digit numbers by one-digit number using formal written method.	Multiply up to 4 digits by a one-digit or two-digit number using a formal written method, including long multiplication for two-digit numbers.	Multiply up to 4 digits by a two-digit number using a formal written method of multiplication.
Developing written methods (conceptual understanding). Children should also understand that multiplication can be done in any order (commutativity).	Using Numicon:  Moving onto arrays in the grid method:  	Once grid method is secure, show how it relates to expanded method:  Then to formal short multiplication method:  	Secure short multiplication for 4 digit number multiplied by a 1 digit number:  Include multiplying by a number that contains decimals (but still by a one-digit number):	Secure formal written method for long multiplication and progress to multiplying up to 4 digits by a two-digit number: 

Anton Junior School Progression in Calculation

	Move onto Dienes to support grid method understanding and then place value counters:  Grid method:  Children need to be taught how to multiply by a multiple of 10 and 100. They also need to be shown how to add up the numbers from the grid.	Grid method for multiply by a number with more than one digit:  	 Once grid method for multiplying by a number with more than one digit is secured, move to expanded:  Then progress to the formal written method for long multiplication:  	Using formal written methods to multiply a decimal by a two or three digit number:  Teach children how to multiply question to make a whole number, then use the inverse (division) to divide the answer.

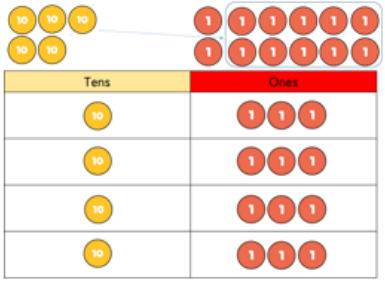
Anton Junior School Progression in Calculation

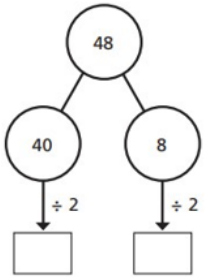
Division				
End of year expectations	**Year 3**	**Year 4**	**Year 5**	**Year 6**
	Write and calculate mathematical statements for division using the times tables they know, progressing to formal written methods.		Divide numbers up to 4 digits by a one-digit number using a formal written method for short division and interpret remainders appropriately for context.	Divide numbers up to 4 digits by a two-digit number using a formal written method for long division and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.
Developing written methods (conceptual understanding).	Using Numicon:  Understanding division as grouping:  Understanding division as repeated addition: 12 ÷ 4 = 3  	Method moving towards standard written method using Dienes to support:   	Secure short division with no remainders. Use short division method interpreting remainders in context and moving onto recording remainders as a fraction:  Answer: 86 remainder 2  Answer: $45\frac{1}{11}$	Secure short division with fraction remainders. Teach formal long division method for up to four digits by two digits. Start with no remainders. Then move to fraction remainders before decimal remainders.  Encourage children to use a 'What I know' box.

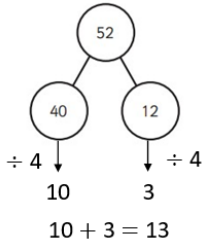
Anton Junior School Progression in Calculation

Grouping on a number line:

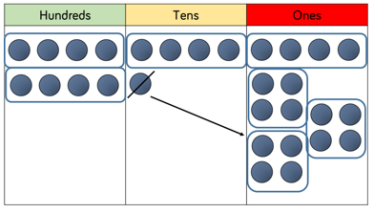
Use partitioning with no remainders – start with place value counters:







$10 + 3 = 13$

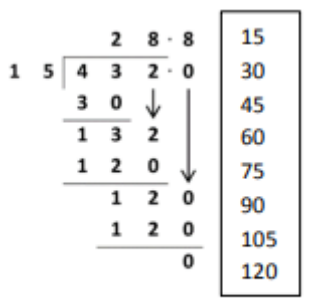


		2	1	4
	4	8	5	$^{1}6$

Introduce decimal remainders:

$142 \div 4 = 35{\cdot}5$

$$4\overline{)1\,{}^{1}4\,{}^{2}2{\cdot}{}^{2}0}\quad 0\,3\,5{\cdot}5$$



Answer: 28·8

Anton Junior School Progression in Calculation

	Children need to recognise when to use multiples of 10 to solve a problem e.g. 72 ÷ 3 60 ÷ 3 = 20 12 ÷3 = 4 20 + 4 = 24 Partitioning with remainders: