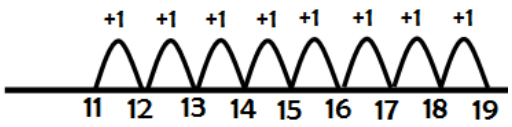
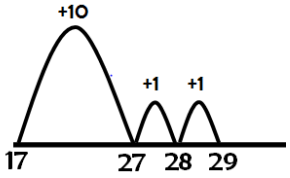
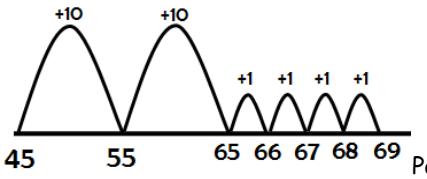
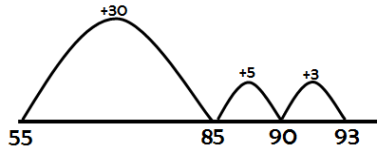
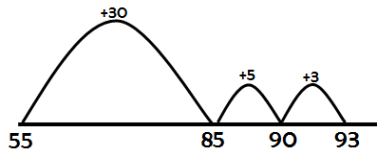
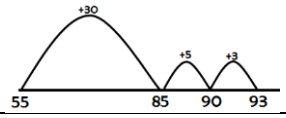
St Anne's Calculation Policy – Addition

Year	What will addition look like?
R	• Counting all- a child doing 2+3 counts out 2 bricks and then three bricks and then find the total by counting all the bricks. • Counting on from the first number- a child finding 3+5 counts on from the first number; 'four, five, six, seven, eight'. • Bead strings, counters, physical objects
1	National Curriculum 2014 • Read, write and interpret mathematical statements involving addition (+)and equals (=) signs • Represent and use number bonds within 20 • Add one-digit and two-digit numbers to 20, including zero • Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = _ - 9. Vocabulary:- • Counting on from the larger number, even when it is not the first number. • Finding totals • Increasing the size of a number (e.g. 5 more than 12) • Using known addition facts to solve addition problems 6+4 5+3 10+8 Use a number line to solve simple addition problems 11 + 8 =  17 + 12 = 29 
2	National Curriculum 2014 ➢ Solve problems with addition: • 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 addition facts to 20 fluently, and derive and use related facts up to 100 ➢ Add 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) ➢ Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. Vocabulary:- • Adding using partitioning (10s and 1s/units) • Counting on from the largest number • Concrete apparatus such as Base 10 and Numicon to be used to support understanding of addition. Use a number line to add 2 digit numbers

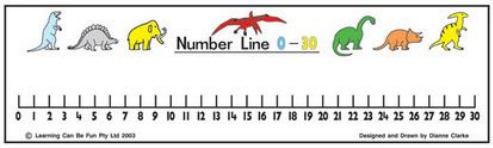
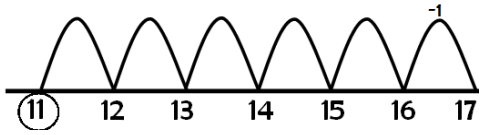
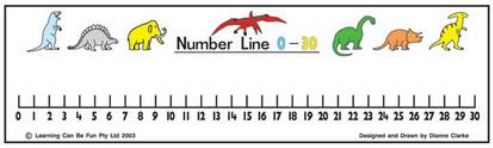
	 Paritition the number we are adding, then add tens and ones.  More able - begin to combine tens and bridge where necessary.
3	National Curriculum 2014 ➢ Solve problems, including missing number problems, using number facts, place value, and more complex addition ➢ Add numbers mentally, including: • a three-digit number and ones • a three-digit number and tens • a three-digit number and hundreds ➢ Add 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 Vocabulary:- • Number line – adding using partitioning • Column addition • Missing numbers • Partition • Expanded method Use a number line when adding (TU+TU, HTU+TU, HTU+HTU)  Use expanded formal written method of column addition once secure with number line method. 288 +166 14 140 300 454
4	National Curriculum 2014 ➢ add numbers with up to 4 digits using the formal written methods of columnar addition ➢ estimate and use inverse operations to check answers to a calculation ➢ solve addition two-step problems in contexts, deciding which operations and methods to use and why. Vocabulary:- • Expanded column addition • Compact column addition • Carry • Place Value Use expanded formal written method of column addition, progressing to compact formal written method (up to ThHTU+ ThHTU)

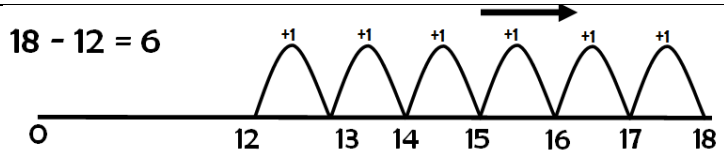
	288 +166 14 140 300 454 489 + 254 743 1 1 Number line continues to support mental addition. Lower ability children will still use a number line until secure. 
5	National Curriculum 2014 ➢ add whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) ➢ add and 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 addition multi-step problems in contexts, deciding which operations and methods to use and why. ➢ solve problems involving number up to three decimal places Vocabulary:- ➢ Expanded column addition ➢ Compact column addition ➢ Carry ➢ Place Value Use compact formal written method (numbers with more than 4 digits) 1489 + 2254 1 1 3743 Use compact formal written method to problem solve (e.g. in the context of money) 3 . 5 6 + 2 . 4 7 6 . 0 3 1 Lower ability children to use expanded method of column addition where necessary (see Year 4)

6	National Curriculum 2014 ➢ solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why ➢ 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 ➢ solve problems involving addition, subtraction, multiplication and division ➢ use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. Use compact formal written method to support problem solving. $$\begin{array}{rrrrr} & & & 4 & 2 \\ & 6 & 4 & 3 & 2 \\ & & 7 & 8 & 6 \\ & & & & 3 \\ + & & 4 & 6 & 8 & 1 \\ \hline & 1 & 1 & 9 & 4 & 4 \\ \hline & 1 & 1 & 2 & 1 & \end{array}$$ Use compact formal written method to add decimals. $$\begin{array}{rrrrrr} & 4 & 0 & 1 & . & 2 & 0 \\ & & 2 & 6 & . & 8 & 5 \\ + & & & 0 & . & 7 & 1 \\ \hline & 4 & 2 & 8 & . & 7 & 6 \\ \hline & & & 1 & & & \end{array}$$

St Anne's Calculation Policy – Subtraction 2017

Red= NC 2014 **Blue= St Annes**

Year	What will subtraction look like?
R	Teacher modelling, pictorial representation Practical demonstrations of subtraction relating to 'take away'. Vocabulary of subtraction in practical activities. Counting out – a child finding 9-3 holds up 9 fingers and folds down three. Counting back from- a child finding 9-3 counts back three numbers from 9; 'eight, seven, six'. Use of number line to support subtraction as taking away.
1	National Curriculum 2014 ➢ read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs ➢ represent and use number bonds and related subtraction facts within 20 ➢ add and subtract one-digit and two-digit numbers to 20, including zero ➢ solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = _ - 9. Vocabulary:- • Subtraction • Takeaway (counting back) • What is … less than … ? • Finding the difference (counting up) • How many more is … than…? **Use a number line to count back ("takeaway") when solving subtraction problems.**  **17 – 6 = 18**  Pupils understand subtraction as **finding the difference** (counting up method on number line). Difference introduced practically and then on a number lines 12 - 5= ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦  **When pupils have understood counting back using their own number line, they can also use a number line to find the difference by counting up.**



2

National Curriculum 2014

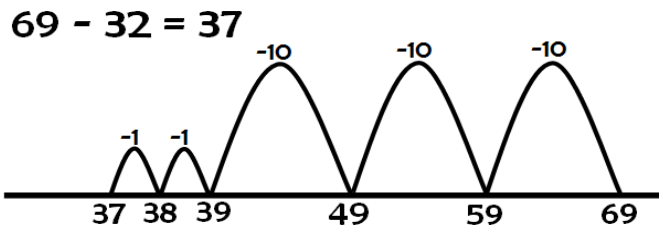
- solve problems with addition and subtraction:
  - using concrete objects and pictorial representations, including those involving numbers, quantities and measures applying their increasing knowledge of mental and written methods
  - recall and use addition and subtraction facts to 20 fluently, and 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
  - 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.

Vocabulary:-

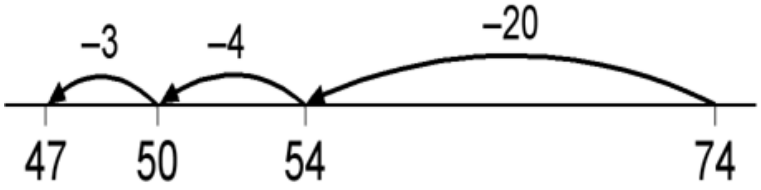
- Subtraction
- Takeaway (counting back)
- What is … less than … ?
- Finding the difference (counting up)
- How many more is … than…?
- Subtraction is not commutative

Use a number line to count back ("takeaway") when solving subtraction problems.

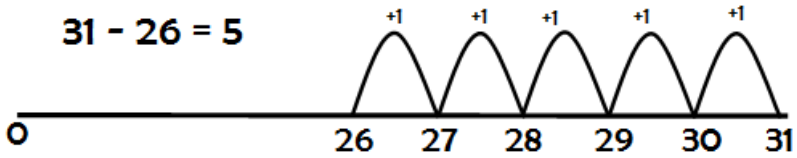
Subtracting 10s and 1s separately

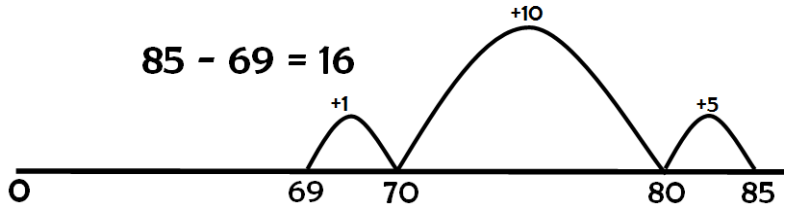


Subtracting multiples of 10 and single digit numbers in one jump (bridging through 10/100 where necessary)



Use a number line to "find the difference" (counting up method on number line).





3

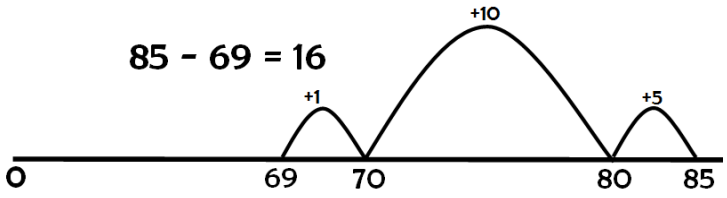
National Curriculum 2014

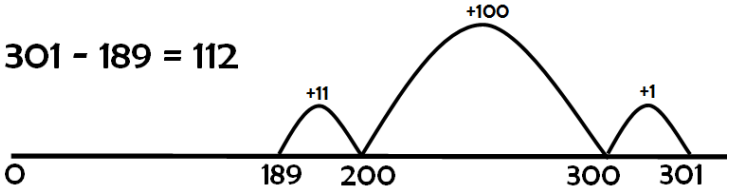
- solve problems, including missing number problems, using number facts, place value, and more complex subtraction.
- subtract numbers mentally, including:
  - a three-digit number and ones
  - a three-digit number and tens
  - a three-digit number and hundreds
- subtract numbers with up to three digits,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

Vocabulary:-

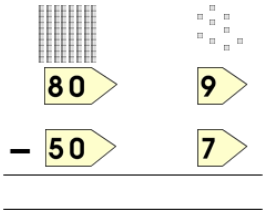
- Subtraction
- Takeaway (counting back)
- What is … less than … ?
- Finding the difference (counting up)
- How many more is … than…?
- Subtraction is not commutative
- Expanded written method for subtraction
- Inverse

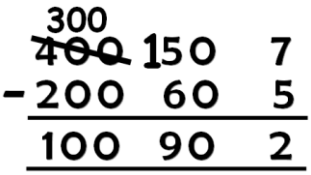
Solve subtraction problems using the counting up method on a number line (finding the difference)





Use formal written expanded method for subtraction. Base ten apparatus us used to support when introduced.





Counting back is still used when subtracting a small number (e.g. 234 - 12) and where appropriate when calculating mentally.

4

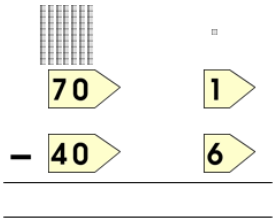
National Curriculum 2014

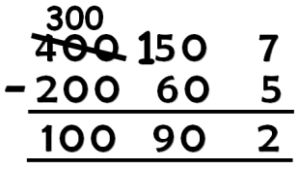
- subtract numbers with up to 4 digits using the formal written method of columnar subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Vocabulary:-

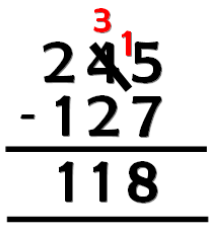
- Subtraction
- Takeaway (counting back)
- What is … less than … ?
- Finding the difference (counting up)
- How many more is … than…?
- Subtraction is not commutative
- Exchanging
- Expanded written method for subtraction
- Inverse

Use formal written expanded method for subtraction. Base ten apparatus us used to support when introduced, including exchanging.

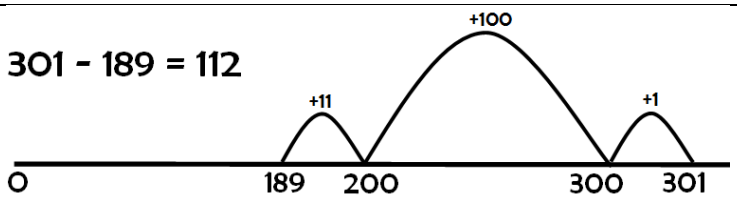


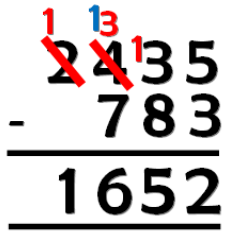
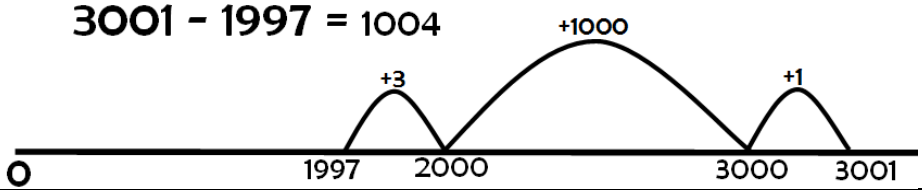


Use formal written expanded method for subtraction, when expanded method for subtraction has been mastered.

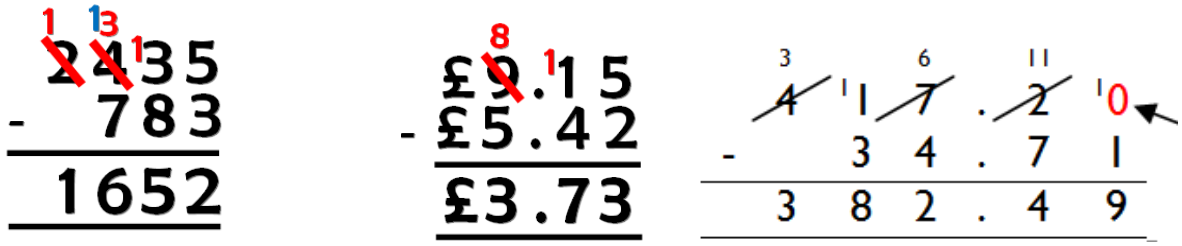


Solve subtraction problems using the counting up method on a number line.

	301 – 189 = 112 

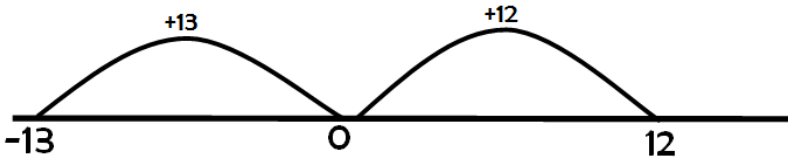
5	National Curriculum 2014 ➢ subtract whole numbers with more than 4 digits, including using formal written method (columnar subtraction) ➢ subtract numbers mentally with increasingly large numbers ➢ use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy ➢ solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. ➢ <u>Vocabulary:-</u> • Subtraction • Compact written method for subtraction • Finding the difference, how many more, how many fewer **Use compact formal written method for subtraction, including for decimals (Some children will still use expanded written (lower ability).**  **Solve subtraction problems by 'finding the difference' using the counting up method.** 3001 – 1997 = 1004 
6	National Curriculum 2014 ➢ solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why ➢ solve problems involving addition, subtraction, multiplication and division ➢ use negative numbers in context, and calculate intervals across zero <u>Vocabulary:-</u> • Subtraction • Compact written method for subtraction • Finding the difference, how many more, how many fewer

Use compact formal written method for subtraction, including decimals.



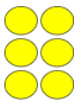
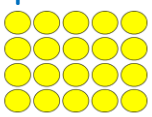
Use a number line when solving problems involving negative numbers.

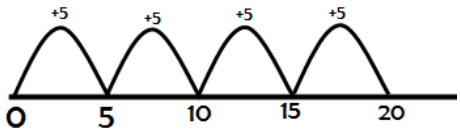
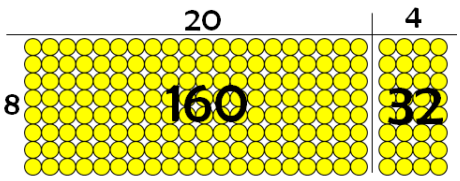
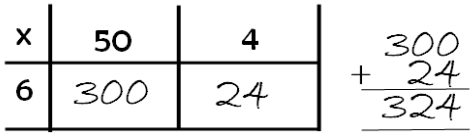
E.g. The difference between -13 and 12 is 25.

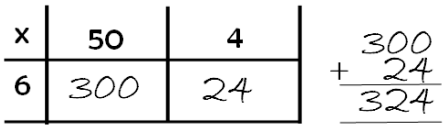
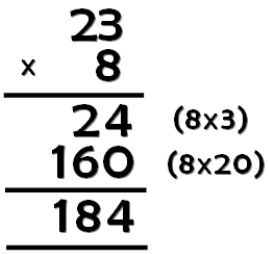


St Anne's Calculation Policy – Multiplication 2017

Red= NC 2014 Blue= St Annes

Year	What will multiplication look like?
R	• Jumping along a number line in steps of…. • Look at patterns/ counting in 1's, 2's, 10's • Grouping objects - counting groups of the same size.
1	**Multiplication in practical context** National Curriculum 2014-solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. Vocabulary:- • *Doubling- all numbers to to 10 (x 2);* • *Grouping- counting in groups of 2, 5, and 10.* • *Repeated addition- Pictorial representation of repeated addition eg 5+5+5* Show the groups in pictures of rows and columns (arrays)  Eg. 6 3 rows of 2 or 2 columns of 3
2	**Representing multiplication using arrays and Repeated addition** • Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×) and equals (=) signs. • Show that multiplication of two numbers can be done in any order (commutative) • Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts Vocabulary:- • *Doubles, multiply, groups of, lots of etc.* • *Multiplication tables- 2 , 5, 10* • *Place value (x10)* • *Clock face (x5)* • *Commutativity (2 x 5= 5 x 2)* • *Arrays* • *Repeated addition* Use of arrays/ repeated addition to solve simple problems  4 x 5 = 20 5 x 4 = 20

	This is the same as 5 + 5 + 5 + 5 or 4 + 4 + 4 + 4 + 4  Use of x and = signs to record calculations.
3	**National Curriculum 2014-** • **Recall and use multiplication facts for the 3, 4 and 8 multiplication tables** • **Write and calculate mathematical statements for multiplication 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 multiplication and division, including positive integer scaling problems and correspondence problems in which 'n' objects are connected to 'm' objects.** Vocabulary:- • *Recalling facts- x 3, 4, 8 tables* • *Mathematical statements- 2 digit x 1 digit* • *Missing number problems* • *Scaling problems* **Informal written method- Grid (Visual representation)**   More able pupils to move to formal column multiplication involving 1 digit x 2 digit numbers, when appropriate. 23 x 8 24 (8x3) 160 (8x20) 184
4	**National Curriculum 2014-** • **Recall multiplication facts for 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. Vocabulary:- • *Recalling facts- up to 12 X 12 tables* • *Commutativity (2 x 5= 5 x 2)* • *Distributive law- 5 x (20+3)= (5 x 20) + (5 x 3) (Partitioning- using grid method)* • *Formal written layout- 1 digit x 2 or 3 digit numbers* *Consolidate informal Grid Method (supporting use of the Distributive law)*  (also 1 digit x 3 digit numbers) **Formal written method of multiplication (expanded version)** 
5	**National Curriculum 2014-** • **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 whole numbers and those involving decimals by 10, 100 and 1000** • **Solve problems involving multiplication including using their knowledge of factors and multiples, squares and cubes** • **Solve problems involving multiplication, including understanding the meaning of the equals sign** • **Solve problems involving multiplication including scaling by simple fractions and problems involving simple rates.** • **Solve problems involving number up to 3 decimal places.** Vocabulary:- • *Multiples , Factors, Common factors* • *Prime numbers, Prime factors, Composite (Non- Prime) numbers* • *Squared (2) ,Cubed (3)* • *Formal written methods- 4 digit x 1 or 2 digit numbers* *Informal Grid Method- for those needing consolidation*

x	50	4
30	1500	120
6	300	24

1500
120
300
+ 24
1944

Formal written method of multiplication

(Expanded)

```
  23
x  8
 24   (8x3)
160   (8x20)
184
```

```
  245
x   6
 30   (6x5)
240   (6x40)
1200  (6x200)
1470
```

Short Multiplication
(up to 1 digit x 4 digit)

```
   2 4
x    6
1 4 4
  2
```

Long multiplication (expanded)
(2 digit x 2 digit)

```
   45
x  36
 30   (6x5)
240   (6x40)
150   (30x5)
1200  (30x40)
1620
 1
```

6

National Curriculum 2014-

- Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- Multiply one-digit numbers with up to two decimal places by whole numbers
- Use written division methods in cases where the answer has up to two decimal places

Vocabulary:-

- *Long multiplication*
- *Interpret remainders*

Formal written method of multiplication

Long multiplication (expanded)

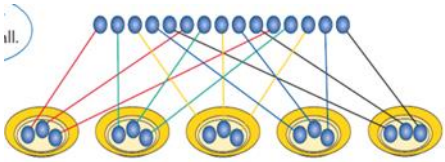
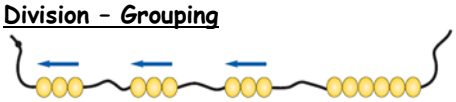
```
  45
x 36
 30   (6x5)
240   (6x40)
150   (30x5)
1200  (30x40)
1620
 1
```

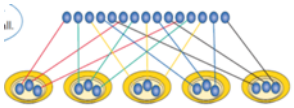
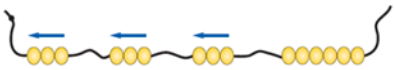
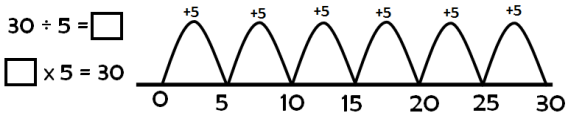
Long multiplication (compact)

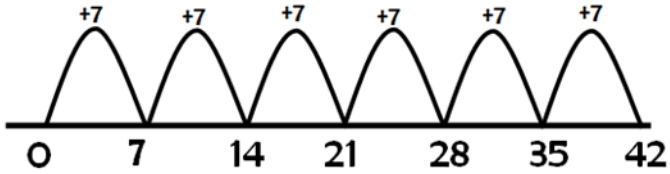
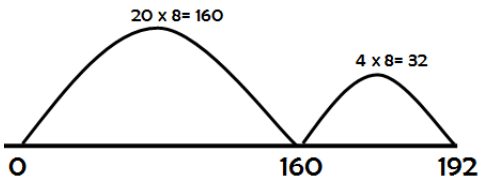
```
   45
X  36
  270
    3
 1350
    1
 1620
```

St Anne's Calculation Policy – Division 2017

Red= NC 2014 Blue= St Annes

Year	What will division look like?
R	Sharing objects into equal groups and count how many in each group, such as 10 biscuits on two plates. • Grouping objects • Link with the pictures for multiplication Eg * * * * * * 6 counters in three rows is 2 6 counters in two rows is 3
1	**National Curriculum 2014- Solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.** Vocabulary:- • *Sharing* • *Grouping* **Solve practical problems that involve sharing into equal groups and grouping.** **Division - Equal Sharing Structure** Children should be given plenty of practical experience of equal sharing. E.g. How many balloons would each person have if we shared them equally? 15 ÷ 5= 3 each  **Division – Grouping**  E.g. How many groups of 3 marbles are there in a set of 15? Use of pictures, concrete apparatus, 100 square (counting back) or number tracks/ lines, to solve problems.

2	**National Curriculum 2014-** • **Recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers** • **Calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs** • **Show that division of one number by another cannot be done in any order (not commutative)** • **Solve problems involving division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.** Vocabulary:- • *Sharing* • *Grouping* • *Repeated addition / subtraction* • *Inverse* • *Equals* • Commutative (Division is not) **Solve practical problems that involve sharing into equal groups and grouping and record using a number line** **Division – Practical understanding of sharing and grouping** 15 ÷ 5 = 3  15 ÷ 3= 5  **Division – Number line** • Understand division as repeated subtraction (sharing) eg 24 shared between 4. 24 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 • Use a number line to make hops- repeated addition (grouping) e.g. How many 5's in 30  *Children begin to record division calculations using the division symbol.* *6 ÷ 2 = □ 20 ÷ □ = 2 □ ÷ 3 = 8*
3	**National Curriculum 2014-** • **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, using mental and progressing to formal written methods** • **Solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.**

	Vocabulary:- • *Sharing* • *Grouping* • *Repeated addition / subtraction* • *Inverse* **Using repeated addition (and inverses) to solve problems on a number line** **Division – Inverse of multiplication** Understanding division as the inverse of multiplication 5 x 4 = 20 4 x 5 = 20 20 ÷ 5 = 4, 20 ÷ 4 = 5 (inverse relationship) **Number Line Method- repeated addition** Solve problems using repeated addition along a number line (e.g. how many groups of 5). 42 ÷ 7 = 6 6 groups of 7 is 42 6x7 =42  *Finding remainders after simple division* *Know when to round the remainder up or down, depending on context of problem*
4	**National Curriculum 2014-** • **Recall division facts for multiplication tables up to 12 × 12** • **Use place value, known and derived facts to divide mentally, including: dividing by 1;** • **Recognise and use factor pairs and commutativity in mental calculations** Vocabulary:- • *Sharing* • *Grouping* • *Repeated addition / subtraction* • *Inverse* • *Chunking* • *Commutativity* **Number Line Method – Chunking** 
5	**National Curriculum 2014-** • **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 division including using their knowledge of factors and multiples, squares and cubes** • **Solve problems involving division and a combination of these, including understanding the**

	meaning of the equals sign • **Solve problems involving division, including scaling by simple fractions and problems involving simple rates.** Vocabulary:- Vocabulary:- • *Factors* • *Multiples* • *Scaling by simple fractions* *Informal number line methods for those needing consolidation* **Formal methods of Division (Short division)** 98÷ 7 becomes:- $\begin{array}{r\|l} & 1\ \ 4 \\ \hline 7 & 9\ {}^{2}8 \end{array}$ **432 ÷ 5=** $\begin{array}{r\|l} & 8\ \ 6\ \text{r}2 \\ \hline 5 & 4\ \ 3\ {}^{3}2 \end{array}$
6	**National Curriculum 2014-** • **Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context** ▪ **Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context** ▪ **Solve problems involving division** ▪ **Use written division methods in cases where the answer has up to two decimal places** **Formal methods of Division (Short and long division)** **Short Division** $\begin{array}{r\|l} & 1\ \ 4 \\ \hline 7 & 9\ {}^{2}8 \end{array}$ **Long Division** $\begin{array}{r\|l} & 2\ \ 8 \\ \hline 15 & 4\ \ 3\ \ 2 \\ & \underline{3\ \ 0\ \ 0} \quad \textit{15 x 20} \\ & 1\ \ 3\ \ 2 \\ & \underline{1\ \ 2\ \ 0} \quad \textit{15 x 8} \\ & \quad 1\ \ 2 \end{array}$ or $\begin{array}{r\|l} & 2\ \ 8 \\ \hline 15 & 4\ \ 3\ \ 2 \\ & \underline{3\ \ 0}\ \downarrow \\ & 1\ \ 3\ \ 2 \\ & \underline{1\ \ 2\ \ 0} \\ & \quad 1\ \ 2 \end{array}$