St Winifred's Catholic Primary School

Calculation Policy

The aims of our Calculation Policy

It is essential that throughout primary school the maths curriculum focuses on developing the three areas of **fluency, reasoning** and **problem solving.** These are the three main aims of the National Curriculum for Mathematics.

At St Winifred's we aim to ensure that when children leave the school they:

- Have a secure knowledge of number facts and a good understanding of the four calculation operations (addition, subtraction, multiplication and division).
- Are able to apply their understanding in a range of contexts, and to explain their thinking using precise mathematical vocabulary.
- Make use of jottings, diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads.
- Have an efficient, reliable, written method of calculation for each operation that they are able to apply with confidence when it is appropriate to do so.

Throughout the school we believe in the importance of following a CPA approach within our lessons to ensure that children have the opportunity to explore and develop conceptual understanding leading to mastery of each area of calculation. It is essential that the models and methods that children use to support their understanding are consistent from class to class and across year groups and therefore we have chosen to adopt those set out in the White Rose schemes. Teachers use these to refer to in their day to day planning and to inform the next steps for the children in their class.
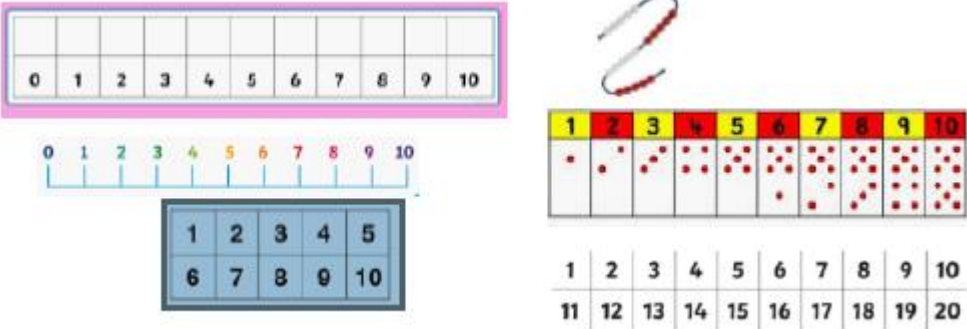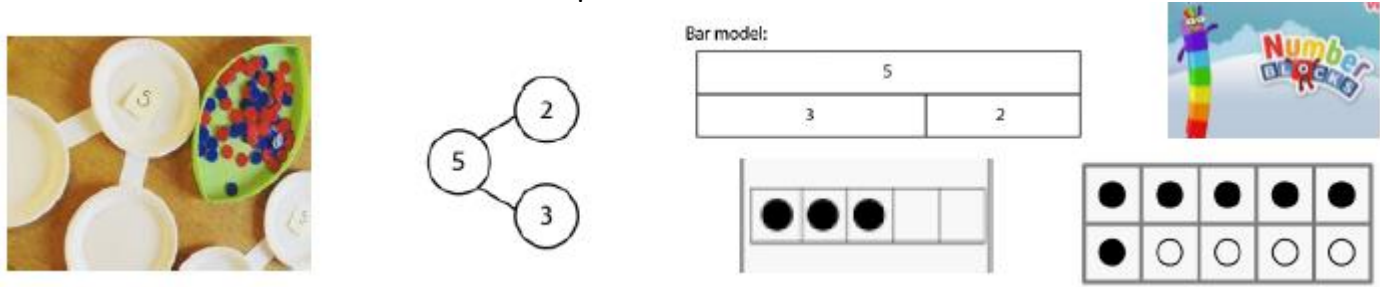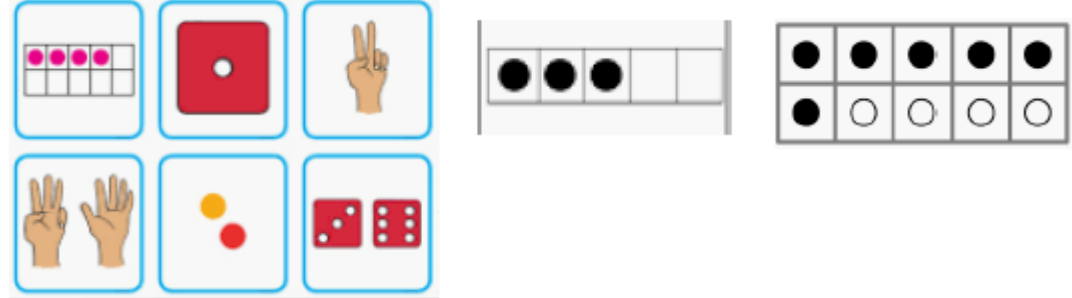
EYFS Goals

Numbers:

-Children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number

-Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer

-They solve problems, including doubling, halving and sharing

Shape, space and measures:

-Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems

-They recognise, create and describe patterns

-They explore characteristics of everyday objects and shapes and use mathematical language to describe them

Reception	Reception	Reception	Reception
Addition	**Subtraction**	**Multiplication**	**Division**
• Find 1 more or 1 less than a number from 1 to 20. • Add together. • Drawing objects. • Counting on. • Introduction to + sign. • Vocabulary: add, plus, is, altogether, more than (verbal). • Select two groups of objects to make a given total.	• Find 1 more or 1 less than a number from 1 to 20. • Take away practically. • Number track provided 0-20. • Drawing. • Number line provided 0-20. • Encourage recording on the number line. • Begin to relate subtraction to 'taking away', 'less' and counting how many are left. • Say how many are left when some are taken away.	• Counting in 2s and 10s. • Using number line to count in 2s. • Number patterns on a 100 square	• Sharing, grouping
		• Counting: Doubling • Use vocabulary such as: double, half halve, part, how many times? • How many shoelace holes are there? How many holes would two shoes have? • How many slices of bread do we need to make 4 whole sandwiches for the café? • How many eggs will fill this box? How many will fill two boxes? • How many wheels do we need for these three lego cars? • How many pairs of socks are there in the launderette? Are there any left over? • Find a partner. How many children are there? How many pairs?	• Counting: Halving • Use vocabulary such as share, group, left over • Can you cut the cake in half? How many pieces? • Fill half the tarts with strawberry jam and half with lemon curd. • How many cakes in the box? Take half of them out. How many are left? • Put half of: the cows in the field, cars in the garage, bears in the forest, etc. • How should we plant the daffodil bulbs in these three pots? • Is there a way of doing it so that they all have the same number? Are there any left over? • Count out these stickers round the circle of children? How many times will they go round? Are there any left over? • Can we share out these cakes fairly? How shall we do it?

Objective	Representations	
Numbers to ten counting forwards and backwards.	Number track / bead strings / any objects that you can think of 0 1 2 3 4 5 6 7 8 9 10 0 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	
One more, one less to ten Partition all numbers to ten	Unifix cubes, 5 and 10 frames, bar model, part- whole model, Number Blocks. Bar model: 5 3 2 5 / 2 / 3 Number BLOCKS	
Subitise and conceptually subitise (calculate numbers without counting on so two dice rolled with 5 and 2 will be 7)		

Key objectives Year 1

Can count aloud, read, write, compare and order numbers

- Can count aloud, read and write numbers to 100
- Can count aloud and read multiples of 2 and 10
- Can order numbers to 10 and multiples of 10

Can count out objects and compare the numbers of objects in sets

- Can count out and say how many objects are in a set with up to 20 objects
- Can decide which of two sets is the larger and know when two sets have an equal number of objects
- Can count and say how many objects there are when they are arranged in 2s or 10s
- Can compare the numbers of objects in two or more sets and order sets of objects by their size
- Can identify halves of shapes and find half of an even-numbered set of objects with up to 20 objects

Can add and subtract sets of objects and pairs of whole numbers

- Can add, sum, total two small sets of objects
- Can take away, subtract and find the difference between two small sets of objects
- Can add and subtract pairs of single-digit numbers
- Can read and write addition and subtraction number sentences interpreting and using notation +, -, =
- Can explain why the order of numbers in subtraction is important but is not so for addition

Can generate and use addition facts: work out related subtraction facts

- Can generate patterns of addition facts for number pairs with totals up to 20
- Can use addition facts to work out related subtraction facts to 20
- Can generate addition facts for all single-digit number pairs to 9+9 and the related subtraction facts for sums to 9+9
- Can add and subtract 10 and multiples of 10

Can name and talk about shapes, give positions and directions

- Can name and talk about properties of the 2-D (flat) shapes: squares, rectangles, triangles?
- Can name and talk about properties of the 3-D (solid) shapes: cubes, cuboids, cylinders, cones
- Can identify the sides and corners of flat shapes and the faces, edges and vertices of solids
- Can give directions, use whole turns and half-turns
- Can talk about the position of objects

Can compare and measure using common standard units

- Can compare and measure length, weight and capacity and use metres, centimetres grams, kilograms, litres, centilitre
- Can tell the time using o'clock and half the hour; can order events over a day and a week
- Can identify the value of and use coins to 50p
- Can sort and classify objects using simple criterion and qualitative and quantitative measures

Can solve problems practically and talk about patterns, solutions and methods

- Can solve problems using practical materials, represent solutions with pictures, objects, and numbers
- Can talk about and make simple patterns and recognise relationships between numbers or shapes
- Can talk about the solutions and methods used and make and explain choices

Suggested oral mental Maths (ongoing, throughout the Autumn term):
- Count forwards and backwards in ones **to 20** beginning from 0 or 1 or any given number
- Read and write numbers from 1-20 in numerals
- Given a number identify the number that is 1 more or less to at least 20
- Say the number that comes between two numbers to at least 20
- Derive number bonds to ten and related addition and subtraction facts
- Double numbers and quantities/sets of objects to at least 5 + 5; find the corresponding halves
- Count in multiples of two from 0 to 20 forwards and backwards
- Recognise and use language relating to dates including days of the week and months of the year (use daily routines to support this)

Suggested oral mental Maths (ongoing, throughout the Spring term):

- Count forwards and backward to at least 50 in ones, beginning with 0 or 1, or from any given number
- Count forwards and backwards in twos to the 10th multiple; in tens to the 10th multiple
- Begin to count forwards and backwards in fives to the 10th multiple
- Given a number identify the number that is 1 more or less within 50 (and beyond) and say the number that comes between two numbers within 50
- Recognise numbers to 20 written in words
- Recall number bonds and related addition and subtraction facts to ten
- Double numbers and quantities to 6 + 6; find the corresponding halves
- Consolidate using ordinal numbers in different practical contexts (first, second, third... tenth)
- Recognise and use language relating to dates, including days of the week and months of the year (use daily routines to support)
- Tell the time to the hour (and half past the hour) using an analogue clock face; relate times to events during the day (use daily routines to support)
- Recognise, name and describe common 2D and 3D shapes; reason about shapes

Oral mental maths (ongoing, throughout the Summer term):
- Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- Given a number identify the number that is 1 more or less within 100; say the number that comes between two numbers within 100
- Recall number bonds to ten; derive number bond within 10; derive number bonds to 20
- Double numbers and quantities to 10 + 10; find the corresponding halves (within 20)
- Count in twos, fives and tens to the 10th multiple, forwards and backwards
- Recognise odd and even numbers (within 20)
- Recognise and tell the time using half past and o'clock (use daily routines to support)
- Recognise and use language relating to dates, including days of the week and months of the year (use daily routines to support)
- Recognise, name and describe common 2-D and 3-D shapes; reason about shapes

Year 1	Year 1	Year 1	Year 1
Addition	**Subtraction**	**Multiplication**	**Division**

Addition

Mental
- Beginning to use symbols + and = and numbers to record number sentences.
- Use knowledge that addition can be done in any order with the use of a hundred square.
- Put larger number first in order to count on.
- Add pairs with a total of 20.
- Recognise odd and even numbers.
- Identify near doubles.
- Begin to partition and recombine by breaking units of 6,7,8,9 into 5 and a bit.
  e.g. work out mentally that
  5+8=5+(5 and 3)
  =5+5+3
  =10+3
  =13

Written
- Adding 2/3 digits e.g.
  3 + 4 + 2 = ☐
  3p + ☐ 8p
- Using a completed number line or track to count on.

1	2	3	4	5	6	7	8	9	10

- Moving to the use of the hundred square to add multiples of 10 and larger numbers.
  e.g. 34+10=   57+30

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Beginning to use an empty number line to count on starting on the left hand side of the line.
7 + 3 = 10

      +1   +1   +1
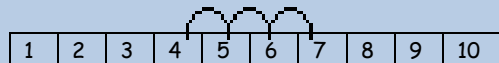 7   8   9   10

Subtraction

Mental
- Put number in head and count back.
- Count back from the largest number.
- Count on to find the difference.

Written
- Symbolic representations: How many less?
- Leading to empty box
  5 – 3 = ☐   ☐ – 3 = 2
  10 – ☐ = 6   ☐ – 4 = 6

- Ensure they understand that they put the largest number first to subtract/take away.
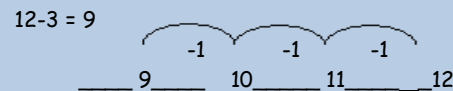- Using a completed number track to count back.

7-3=4

1	2	3	4	5	6	7	8	9	10

- Moving to the use of the hundred square to subtract multiples of 10
e.g. 52-10 =   89-40=

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Beginning to use a blank number line to count back starting on the right hand side of the line
  12-3 = 9

          -1   -1   -1
  ____ 9____   10____ 11____ __12

Multiplication

Mental
- Counting in 2s, 10s and 5s.
- Doubling of numbers to 10.
- Repeated addition.
- Rhymes and stories which involved counting in twos, fives or tens.

Written
- Initially pictorially.

2 + 2 + 2 = 6   ☆☆   ☆☆   ☆☆

3 x 2 = 6

3 groups of 2 total 6

2 groups of 3: using story sentences e.g. 2 bags with 3 apples each, practical activities.

- Introduce arrays (R X C)

  3 X 2 =   or   2 X 3

Division

Mental
- Halving of numbers to 20.
- Counting patterns and equal groups.
- Counting backwards in equal intervals.

Written
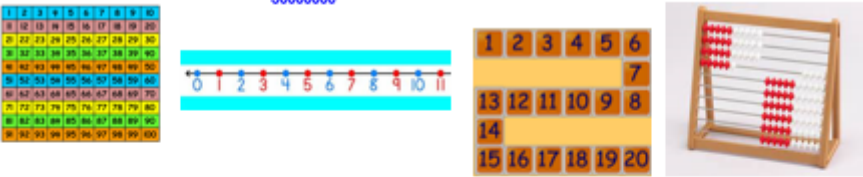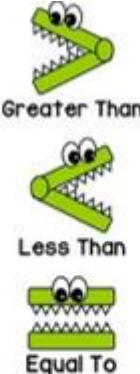6 shared between 2 =
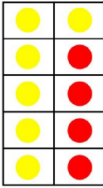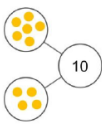
6÷2 =

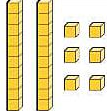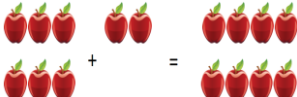| Knowledge	Skills	Vocabulary
Number and place value	• Use a number line, number square or number track to 100 to count one more/ one less Hundred square number line number track Rekenrek • Identify, compare, sort and order numbers up to 100. • Find a missing number in a number sequence. • Solve number problems that involves counting in ones. • Use numbers up to 100 and understand the meaning of each number by recognising and knowing their clusters. • Use symbols (bigger than, smaller, equal to the same as) correctly. Greater Than Less Than Equal To • Represent numbers using a variety of manipulatives Numicon Counters Coins Place Value and Dienes	
Addition and subtraction	Use a variety of ways to add and subtract numbers up to 100.	

Tens Frame	Part Whole Model	Bar Model

10	
6	4

Tens Frame:
6 + 4 = 10
4 + 6 = 10
10 – 4 = 6
10 – 6 = 4

Part Whole Model:
6 + 4 = 10
4 + 6 = 10
10 – 4 = 6
10 – 6 = 4

Bar Model:
6 + 4 = 10
4 + 6 = 10
10 – 4 = 6
10 – 6 = 4

Dienes   Number Line

Concrete materials   beads

+   =

2 + 5 = 7   Numicon

- Adding 2/3 digits e.g.
  3 + 4 + 2 = ☐
  3p + ☐ 8p
- Using a completed number line or track to count on.

1	2	3	4	5	6	7	8	9	10

- Moving to the use of the hundred square to add multiples of 10 and larger numbers.
  e.g. 34+10=   57+30

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Beginning to use an empty number line to count on starting on the left hand side of the line.
7 + 3 = 10

+1   +1   +1

7   8   9   10

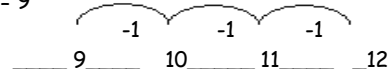| Subtraction | • Children need to be exposed to the two main models of subtraction: counting on and counting back using a variety of models and resources.
 • Counting back

 •
 • Ensure they understand that they put the largest number first to subtract/take away.
 • Using a completed number track to count back.

 7-3=4

 Leading to empty box
 5 – 3 = ☐   ☐ - 3 = 2

 10 - ☐ = 6| ☐ - 4 = 6

 • Moving to the use of the hundred square to subtract multiples of 10
 e.g. 52-10 =   89-40=

 • Beginning to use a blank number line to count back starting on the right hand side of the line
 12-3 = 9

 _____ 9_____   10_____ 11_____12 | |

Multiplication and division	Numicon

two
2

four
4

six
6

Skip counting in twos/counting even numbers –
number line:

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

- Use concrete sources, role play, stories and songs to count in twos, fives and tens.

- Make and add equal groups by grouping and sharing

6 shared between 2 =

6÷2 =

- Make doubles

- Initially pictorially.

2 + 2 + 2 = 6

3 x 2 = 6

3 groups of 2 total 6

2 groups of 3: using story sentences e.g. 2 bags with 3 apples each, practical activities.
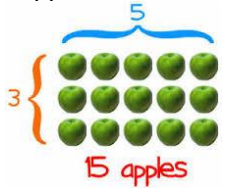
	• Introduce arrays (R X C) 3 X 2 = or 2 X 3 • solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. 5 3 15 apples	
Fractions	How can we cut these objects in half? Can any of the objects be cut in half in more than one way? ' Which circles have been split into equal halves? ' Match the halves to make 5 complete shapes. • • To find a half and a quarter of an object, shape or quantity using a variety of manipulatives.	
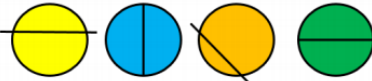
Key Objectives Year 2

Can count forwards and backwards and recall basic number facts
-Can count forwards from zero in 1s, 2s, 3s, 4s, 5s, 10s
-Can count forwards and backwards from any number in steps of 1, 2, and 10
-Can count in multiples of 10 and 100
-Can recall addition facts up to 9 + 9 and derive the related subtraction facts
-Can add and subtract multiples of 10 and 100
Can partition and identify the value of the digits in 2-digit numbers

-Can partition 2-digit numbers into 1s and 10s state the value of the digits

-Can order numbers to 100, record results using <, >, =

-Can compare and order numbers to 100 and multiples of 10 and 100

<u>Can add and subtract whole numbers mentally and use a written method</u>

-Can use add and subtract practically and mentally 1-digit numbers to/from 1-digit and 2-digit numbers

-Can add and subtract mentally 10 and multiples of 10 to/from 2-digit numbers

-Can find missing numbers in number sentences that involve the addition or subtraction of 1-digit numbers

-Can add and subtract two 2-digit numbers

-Can use a written method to add and subtract numbers they cannot do mentally

<u>Can carry out simple multiplication and division; use fractions in practical contexts</u>

-Can double numbers to 10 and halve the even numbers to 20

-Can multiply by 2, 3, 4, 5 and 10 using counting strategies and arrays and derive number facts

-Can divide by 2, 3, 4, 5 and 10 using equal sharing and counting strategies and derive number facts

-Can recall multiplication facts for 2, 5 and 10

-Can read and write multiplication and division number sentences using notation x, ÷, =

-Can find halves, thirds, quarters and fifths of quantities in practical context

<u>Can name and describe basic properties of 2-D and 3-D shapes, position and movement</u>

-Can name 2-D (flat) shapes, describe the sides and corners, and identify right angles and lines of symmetry

-Can name 3-D (solid) shapes, describe the faces, edges, vertices, and identify flat and curved faces

-Can describe the position of shapes and movement, including straight and turning movement

<u>Can measure using standard metric units; read simple scales and tell the time</u>

-Can read numbered and partially numbered scales, including temperature in °C

-Can use equipment to measure length in m or cm or mm

- Can use equipment to measure weight in g or kg

-Can use equipment to measure capacity in l or cl or ml

-Can identify angles in shapes and as measure of turn, use right angles, tell time to quarter hour and 5 minute intervals

-Can identify the value of coins and notes, use coins to make payments and give change from £

 Can generate and describe patterns and relationships, make predictions and test with examples

<u>Can solve simple word problems, generate patterns, and explain solutions and methods</u>

-Can solve practical and simple word problems involving the four operations

-Can explain solutions and methods, use mathematical language, diagrams, symbols

-Can generate and describe patterns and relationships, make predictions and test with examples

| Year 2	Year 2	Year 2	Year 2
Addition	Subtraction	Multiplication	Division

Column 1 (Yellow)

Mental
- Range: No's 0 – 100
- Adding : a two digit numbers and ones
  A two -digit number and tens
  Two two-Digit numbers
  Three one -digit numbers
- Adding several numbers
- Addition bonds for all numbers to 10 then 100
- Largest number first. Focus on place value
- Partition into 100s, 10s and units
- Draw own number line
- Add 3 numbers by using strategies such as: look for pairs that make 10, start with largest number
- Work out mentally, questions like:
  2 + 7 + 4 =   1 + 9 + 5 =
- Identify near doubles by using doubles already known, e.g. 40 + 39 = (double 40 take away 1)
- Recognise symbol such as Δ to stand for unknown number
- Know multiples of 10 that total 100

Written
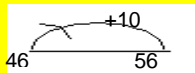- Adding 9 by adding 10 and adjusting

42   +10   52
-1
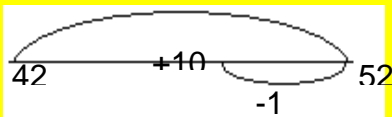
- Solve number problems using conventional signs and symbols
- Develop children's own recording in the context or practical work and explaining how problems were solved using a number line or number grid to count on in 1s or 10s (or in head)
  46+3=46

+1   +1   +1

46   47   48   49
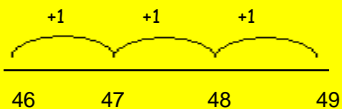
46+10=46

+10
46   56

Begin to model sums shown as 46+12 =

and   46+
           12

Column 2 (Blue)

Mental
- Range: No's 0 – 100
- Subtracting : a two digit numbers and ones
  A two -digit number and tens
  Two two-Digit numbers
- Use number line.
- Take away
- Subtract
- Difference between
- How many more?
- Find a small difference by counting up
- Subtract 2, 2 digit numbers
- Subtract 'teens' numbers from 2 digit number
- Partition into 100s, 10s and units
- Partition two digit numbers in different ways (for example , 23= 20+ 3 , 23 = 10+13)
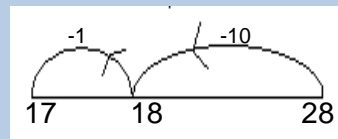
Written
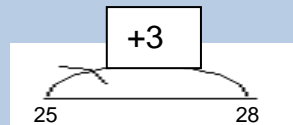Empty number box problems
10 – 7 = ☐

10 - ☐ 3

- Subtract 9 by subtracting 10 and adjusting leading to subtract 19
- Partition numbers into tens and units on a blank number line

- Use an empty number line to count on/back to find the difference
28-11=17   (count back)

-1   -10

17   18   28

28-25 = 3 (count on)

+3

25   28

Begin to model subtraction as 45-12 = and

 45
-12

Column 3 (Orange)

Mental
- Counting in 2s,3s,4s 5s and 10s
- Times/multiply
- Use 'X' sign in number sentences.
- Know 2,5,10 times tables
- Know that multiplication is commutative

Written
Introduce arrays as a form of recording. Number in rows times number in columns

3 x 6
(R X C)
· · · · · ·
· · · · · ·
· · · · · ·

6 X 3
(R X C)

· · ·
· · ·
· · ·
· · ·
· · ·
· · ·

- Multiplication as repeated addition using blank number line

6 x 3 = 18

+3 +3 +3 +3 +3 +3
0   3   6   9   12 15 18

Column 4 (Green)
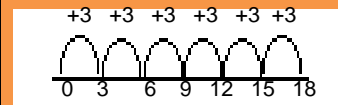
Mental
- Equal sharing
- Know 2,5,10 times tables
- Use ÷ sign in number sentences
- Equal sharing
- Know that division cannot be done in any order

Written
Sharing 12 sweets between 4.
How many do they each have?

ooo ooo ooo ooo

Move to using a blank number line and repeated subtraction

12 ÷ 4 = 3

-4   -4   -4

0   4   8   12

Key Objectives Year 3

<u>Can count, partition whole numbers and read negative numbers</u>

-Can identify odd and even numbers and sequences

-Can count forwards and backwards in steps of 1, 2, 3, 4, 5, 6, 10 and 100

-Can read and write 3-digit and 4-digit whole numbers
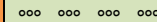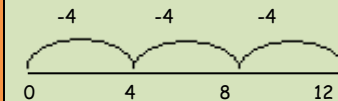
Can identify the value of digits in 4-digit numbers and partition into 1s, 10s, 100s, and 1000s

-Can use £.p notation and negative numbers in context

<u>Can add and subtract mentally, and use jottings and reliable written methods</u>

-Can recall addition/subtraction facts to 18, to add/subtract mentally and with jottings 1-and 2-digit whole numbers

-Can add and subtract pairs of 10s, 100s, 1000s and add and subtract them to/from other whole numbers

-Can use the inverse relationship between addition and subtraction to derive related number sentences

-Can partition numbers, use place value to approximate and check addition and subtraction calculations

-Can use reliable written methods for addition and subtraction with up to 3-digit numbers they cannot do mentally

<u>Can multiply and divide, recall and derive number facts</u>

- Can multiply and divide practically, 2-digit by 1-digit whole numbers and identify a remainder after division

-Can record simple multiplication and division number sentences using x, ÷, = and find missing numbers

-Can derive and recall multiplication facts for the 2, 3, 4, 5, 6, 10 times tables and multiplication by 10s

-Can derive division facts from the 2, 3, 4, 5, 6, 10 times tables

<u>Can describe a fraction as part of a whole, find fractional parts in practical contexts</u>

-Can read and write unit fractions up to one tenth and recognise the part they represent of a whole

-Can read and write proper fractions up to the tenths

-Can identify when a fraction is the same as one whole

-Can work out fractional parts in practical contexts

<u>Can measure and record accurately and describe properties of shape</u>

Can measure length accurately and record lengths using m and cm units

Can measure weight accurately and record weights using g and kg units

-Can measure capacity accurately and record capacities using l and cl units

-Can tell the time in hours and minutes and work out intervals of time during part of a day

-Can compare and order angles in 2-D shapes

-Can name, describe and draw 2-D shapes on grids

- Can describe properties when classifying 3-D shapes

<u>Can interpret data in tables and charts and read partially numbered scales</u>

-Can collect, organise and present data using tables, pictograms and block and bar charts

-Can extract data presented in tables and charts

-Can use partially numbered scales to measure

-Can solve one- and two-step problems, interpret solutions, explain methods and offer ideas

-Can solve one-step and two-step problems involving all four operations, money and measures

-Can explain choice of method and interpret solutions in the context of the problem

-Can describe how a method works and offer ideas about how it might be used in other contexts

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-Can describe how a method works and offer ideas about how it might be used in other contexts

Year 3	Year 3	Year 3	Year 3
Addition	**Subtraction**	**Multiplication**	**Division**

Addition

Mental
- Put largest number first
- Adding : a three digit numbers and ones
  A three -digit number and tens
  A three digit number and hundreds
  Three one and two digit numbers
- Add several numbers
- Place value for 2, 3 and 4 digit numbers
- Partition and recombine (into5 and a bit when adding6, 7, 8 or 9)
- Identify and use near doubles
- Bridge through multiples of 10 and adjust
- Recognise addition as the inverse of subtraction

Written
- Empty number boxes with missing numbers in all three positions e.g.

$34 + 5 = \square$
$34 + \square = 39$
$\square + 5 = 39$

- Begin to use expanded method by partitioning. Start with 2 digit plus 2 digit with no carry

```
  42
+ 24
   6
  60
  66
```

- Move on to carrying

```
  43
+ 38
  11
  70
  81
```

- Move to 3 digit + 3 digit when confident

```
 242
+245
   7
  80
 400
 487
```

Subtraction

Mental
- Subtracting : a three digit numbers and ones
  A three -digit number and tens
  A three digit number and hundreds
- Subtract mentally a near multiple of 10,100 to or from a three digit number
  i.e. 284 – 9 = 275
  (284 – 10 + 1)

  284 – 19 = 265
  (284 – 20 + 1)

  284 - 99 = 185
  (284 – 100 + 1)
- Recognise that when 2 numbers are close together it is easier to count up to find the difference
  143 – 138 =
  138 + $\triangle$ = 143
- Partition three digit numbers in different ways (for example , 246= 200 +40+6
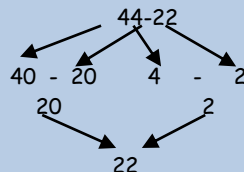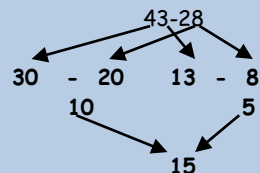 = 100+140+6
  =100+130+16
- Mentally/informally begin to use expanded method by partitioning

Written
- Empty number boxes with missing numbers in all three positions e.g.
  34 - 5 = $\square$
  39 - $\square$ = 34
  $\square$ - 5 = 34
- Begin to use expanded method by partitioning. Start with 2 digit minus 2 digit with no carry.

44-22
40 - 20   4 - 2
20   2
22

- Move on to taking

43-28
30 - 20   13 - 8
10   5
15

- Begin to use expanded method by partitioning. Start with 2 digit minus 2 digit with no exchange.

```
  48
- 24
   4
  20
  24
```

- Move to 3 digit - 3 digit when confident with exchange

Multiplication

Mental
- Use knowledge of number facts and place value to X by 2,3,4,5,6,10 and 100
  E.g 2x5 = 10   100x5 =500
       4x5 = 20   40 x5 =200
- Use doubling and halving
- Know that multiplication can be done in any order
- Recognise as inverse of division
- As scaling up getting X times bigger

Written
- Use the grid method, starting with 2 digit by 1 digit. Ensure that the number you are multiplying by goes vertically in the grid

25 x 4=

x	4
20	80
5	20

80+20 = 100

- Move to 2 digit by 2 digit

36 x 13=

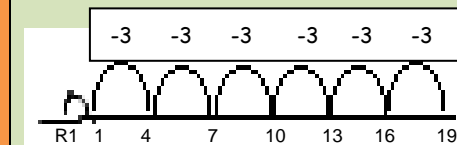| x	10	3
30	300	90
6	60	18

300+90+60+18=468

Division

Mental
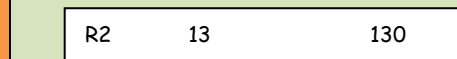- Introduce remainders
- Recognise as inverse of multiplication

Written
- Using repeated subtraction to divide numbers with remainders

19 ÷ 3 = 6 r 1

- Begin to start to take away larger numbers.

145 ÷ 13 = 11 r 2

Key Objectives Year 4

Can read, write and interpret whole and decimal numbers

- Can read and write whole numbers with up to 6 digits and identify the value of the digits
- Can interpret and record numbers with 2 decimal places using them in money and measure contexts
- Can partition whole and decimal numbers
- Can count forwards and backwards in any single- digit steps and in steps of 10, 50, 100, 500, and 1000
- Can round numbers to the nearest 10, 100 and 1000

Can recall number facts and use them to calculate mentally and in context

- Can add and subtract in my head pairs of 1- and 2-digit whole numbers
- Can add and subtract in my head quantities of money in £s and pence

Can recall the multiplication tables to 10 x 10
- Can give the two division facts for a given multiplication fact
- Can multiply and divide in my head using my tables

Can use reliable and efficient written methods of calculation; apply the inverse relationships

- Can use efficient written methods to add and subtract 3- and 4-digit whole numbers
- Can use a reliable written method to multiply and divide 2- and 3-digit numbers by a 1-digit number
- Can record the remainder after division and interpret it in the context of the problem

C4. Can use inverse relationships between multiplication and division, addition and subtraction, to find missing numbers

Can find unit fractions of quantities and order fractions with like denominators

- Can find a unit fraction of a quantity by dividing--Can compare, order, add and subtract simple fractions with like denominators
- Can count up to and past 1 in unit-fraction steps

Can measure and draw accurately, and identify properties of shapes and angles

- Can measure accurately using metric units for length, weight, capacity and record answers using correct units
- Can use a ruler to measure and to draw 2-D shapes accurately on a grid
- Can find the perimeter of simple rectangular shapes
- Can name and compare angles; identify quarter, half and whole turns and lines of symmetry
- Can read and interpret times presented in 12-hour and 24-hour notation and calculate time intervals
- Can add and subtract measures in decimal notation

Can interpret data in tables and bar charts, and read partially numbered scales accurately

- Can use Venn and Carroll diagrams to sort and organise data and to solve problems
- Can interpret intervals on partially numbered scales
- Can read data from, and organise, present information using tables and bar charts

Can represent problems and solutions, identify and describe patterns

- Can solve word problems involving money, measures and unit fractions
- Can identify and describe patterns and relationships and test if examples match general statements
- Can represent problems and solutions using symbols and diagrams, and share explanations and reasons

Year 4	Year 4	Year 4	Year 4
Addition	Subtraction	Multiplication	Division

Addition

Mental
- Partitioning into thousands, hundreds, tens and ones

e.g 4621+1245+

5+1

20+40

600+200

4000+1000

Written
- Continue work from Y3 using expanded method
- When ready move to column method. Stress the importance of setting out in correct columns

- Start without any carrying

```
  623
+152
  775
```

- Move to sums with carrying

```
  764
+128
  892
   1
```

- Extend to decimals when ready

```
237.4+
+142.3
379.7
```

```
456.9
+210.5
667.4
   1
```

Subtraction

Mental
- Know that subtraction is not commutative
Encourage estimating the answer first

Written
- Continue work from Year three with expanded method

HTU -   TU
HTU -   HTU
Th.HTU - HTU

- Only when ready move to the compact method without taking

```
  645
-132
  513
```

- Move to compact method with taking

```
    4 14
  654 -
  246
  408
```

- Extend to decimals when ready

```
267.4
-142.3
125.1
```

```
    3 15
 456.9
- 270.5
 186.4
```

Multiplication

Mental
- Know by heart multiplication facts for the times tables up to x 10, including multiplication by 0 and 1
- Multiply a multiple of 100 by 10 e.g. 600 x 10 = 6000 by shifting digits
- Derive corresponding division facts
- Derive quickly related facts for doubling
- Use and adjust near doubles
- Multiply any 2-digit number by 10 then 100
Approximate first e.g. 23x8 is approximately 20x10= 200

Written
Partitioning using distributive law
47x5=(40x5) + (7x5)

47 x 5 = (40 x 5) + (7 x5)

Grid method HTU/TU x U/TU

32X17=

X	10	7	Total
30	300	210	510
2	20	14	34
			544

125X11=

X	10	1	Total
100	1000	100	1100
20	200	20	220
5	50	5	55
			1375

When ready lead to expanded short method
TUXU
HTUXU

```
    56              56
  X 27            X 127
   42  (7 x 6)     42   (7x6)
  350  (7 x 50)   350   (7x 50)
  120  (20 x 6)   120   (20x6)
 1000  (20 x 50) 1000   (20x50)
 1512             600   (100x6)
                 5000   (100x50)
                 7112
                   1 1
```

Division

Mental
- Using tables facts
- Divide a multiple of 100 by 10 e.g. 600 ÷ 10 = 60 by moving shifting digits
- Use repeated halving e.g.
60÷4=
60÷2=30
30÷2=15
- Using multiples of the divisors (chunking)

Written
- Identifying useful multiples 1, 2, 5,10,20,50
- Largest possible 'chunk' subtracted first
- On a number line (see below)
- 3 Digit divided by 1 digit
- Give remainder as a whole number
- Begin to know whether to round up or down

256 ÷ 7=36 r 4


```
0  4     46          186        256
      -42         -140        - 70
```

- Introduce grid method

364÷3=

3	364	Total
H	364 300	100
T	64 60	20
U	4 3	1
R	1	1
		121 r1

Key Objectives Year 5

Can interpret and use whole, decimal and negative numbers

- Can give the value of the digits in decimal numbers with up to three decimal places
- Can order decimal numbers
- Can multiply and divide whole numbers and decimals by 10, 100 and 1000
- Can round whole numbers and use rounding to estimate answers to calculations
- Can interpret negative numbers in context

Can recall number facts quickly and use these to calculate mentally

- Can multiply and divide mentally, 1-digit and 2-digit whole numbers by a 1-digit number
- Can scale whole number quantities up and down by 10 and by multiples of 10
- Can recall quickly multiplication and division facts from the times tables to 10 x 10
- Can quickly add and subtract mentally, combinations of 1-digit and 2-digit whole numbers
- Can find multiples and factors and recognise square and prime numbers

Can use efficient written methods to calculate for all four operations

- Can use written methods to add/subtract whole numbers with up to 5 digits; decimal numbers with 2 decimal places
- Can use efficient written methods to multiply 3-digit numbers by 2-digit numbers and divide by 1-digit whole number
- Can use the inverse relationships to re-present and simplify calculations, using brackets appropriately

Can simplify fractions, and interpret percentages and ratios

- Can simplify fractions and change improper to mixed fractions
- Can add and subtract simple fractions
- Can find a fraction of a entity by dividing by the denominator and multiplying by the numerator
- Can interpret a percentage and find simple percentages of quantities
- Can interpret simple ratios in context

Can measure accurately, plot points, measure angles and identify properties of shapes

- Can measure accurately using metric units for length, weight, capacity and record answers using decimals
- Can measure angles accurately in degrees
- Can calculate missing angles on a straight line and about a point
- Can identify properties of triangles and quadrilaterals
- Can find perimeters and areas of rectangular shapes
- Can plot coordinates and draw shapes accurately on a grid and move them around the grid
- Can interpret timetables and calculate time intervals from the 12 hour and 24 hour clock

Can draw read data from bar and line charts and interpret scales

- Can draw and interpret bar and line graphs
- Can find and read intervals accurately on partially numbered scales

Can solve one- and two-step problems involving decimals; explain methods, infer and reason

- Can solve one-step and two-step problems involving all four operations, whole and decimal numbers
- Can justify choice of methods and present solutions using diagrams, graphs and symbols
- Can explore patterns, relationships and properties, make and test inferences, and explain reasoning

Year 5	Year 5	Year 5	Year 5
Addition	**Subtraction**	**Multiplication**	**Division**

Addition

Mental
- Use empty number lines as for Y3 and 4.
- Recognise when a written or mental strategy (with or without jottings) is more efficient.
- Add numbers with more than four digits e.g 12,462+10,001

Written
- Continue from Year 4 with compact method. Only use carrying when confident. Move on to working with thousands and tens of thousands.
- Include sums with decimals.
- Ensure children line up numbers and decimal points correctly

```
  33 764
 +24 128
  57 892
      1
```

- Move on to decimals

```
  23 456.9
 + 12 210.5
  35 667.4
      1
```

Subtraction

Mental
- Use empty number line as for Y3 & 4.
- Recognise when a written or mental strategy (with or without jottings) is more efficient.
- Subtract numbers with more than four digits e.g 23,345-12,034

Written
- Continue from Year 4 with compact method. Only use decomposition when confident. Move on to working with thousands and tens of thousands.
- Include sums with decimals.
- Ensure children line up numbers and decimal points correctly

```
   7 15
  856.9 -
 - 290.5
   566.4
```

- Move on to decimals

```
    2  14
  23, 456.9
 - 12, 710.5
  10, 240.4
```

Multiplication

Mental
- Know all multiplication tables
- Mental calculations with jottings

Using Factors
15×6 $15 \times 3 = 45$
           $45 \times 2 = 90$

Using Partitioning
$47 \times 5 = (40 \times 5) + (7 \times 5)$
        $= 200 + 35$
        $= 235$

Written
- Develop expanded short method (as in yr. 4) when ready lead to compact method

Only when ready move to compact method

- **Th H T UXU with carrying**
- **Th H T UXTU**

```
   5423
   x 6
  32538
  3 2 1 1
```

```
   2560
   X 15
  25 600
  12 800
   2 3
  _____
  38,400
    1
```

Extend to decimals with one decimal place

Division

Mental
- Use corresponding division facts.
- Mental calculations with jottings

Using factors
$90 \div 6$ $90 \div 3 = 30$
          $30 \div 2 = 15$

Written
- Use known multiples. Explicit links to tables i.e. 6x7 (replaces 5x7 and 1 x 7)
- Develop grid method (as in yr. 4)

Four digits by one digit

3	3364	Total
TH	3364 3000	1000
H	364 300	100
T	64 60	20
U	4 3	1
R	1	1
		1121 r1

- Begin to give remainders as a quotient, fraction or decimal fraction.
- Move to 'bus shelter ' method for short division

Use long method for four digit divided by two digits up to 20
Use long method for four digit divided by one digit

```
1874 ÷ 13 = 144 R 2
      13 | 1874
           1300      (100x13)
           0574
            520      (40x13)
            054
             52      (4x13)
              2
```

Divide   Th H T U ÷U
   3 291÷3 =

```
     1 09  7
   3 | 32₂9 ₂1
```

Key Objectives Year 6

Can interpret, order and manipulate whole and decimal numbers
-Can identify the value of the digits in decimal numbers with up to three decimal places
-Can round whole and decimal numbers
-Can read negative numbers on scales and work out intervals, including those that cross zero
- Can order decimals and simple fractions

Can calculate mentally and recall number facts immediately
-Can add and subtract mentally, pairs of whole numbers to 100 and decimals to 1 decimal place
-Can multiply and divide numbers by multiples of 10 and 100
-Can recall immediately number facts from the 10 x 10 tables and use to calculate mentally
-Can multiply and divide mentally numbers with up to 1 decimal place by whole numbers
-Can find factors, multiples and square numbers

Can use efficient written methods of calculation for all four operations
-Can use efficient written methods to add and subtract whole and decimal numbers with 4 or more digits
-Can use efficient written methods to multiply and divide numbers with up to 3 digits by a 1- or 2-digit number
-Can represent division as a fraction and interpret a remainder after division in the context of the question

Can manipulate fractions, use and interpret percentages and ratios
-Can simplify a fraction and recognise when it is in its simplest form
-Can order simple fractions
-Can find a fraction and a percentage of a quantity --Can add and subtract fractions in practical contexts
-Can convert between simple fractions, decimals and percentages
-Can solve simple ratio and scaling problems

Can measure accurately, transform shapes and identify their properties
-Can measure accurately and convert between the common standard metric units of measure
-Can measure and draw angles accurately and find a missing angle in a triangle
-Can draw 2-D shapes accurately, reflect and translate shapes on a grid, and name shapes in any orientation
-Can identify, describe and use the properties of different triangles and quadrilaterals
-Can plot coordinates and find the area and perimeter of shapes on a grid
-Can interpret diagrams and nets of 3-D shapes

Can construct and read data presented in tables, charts and graphs; interpret different scales
-Can construct frequency tables, interpret and describe patterns and trends on bar and line graphs
-Can describe the difference between discrete and continuous data
-Can read values and interpret intervals on partially numbered scales -Can use the language of probability to describe the chance of events occurring

Can solve multi-step problems, check solutions, use symbols to represent numbers
-Can solve multi-step problems, provide answers to a required degree of accuracy and check solutions
-Can explain methods and working using diagrams, graphs, mathematical language and notation-Can describe patterns and relationships, use symbols for numbers and   express simple formulae in words

Year 6	Year 6	Year 6	Year 6
Addition	**Subtraction**	**Multiplication**	**Division**
Mental • Use empty number lines as for Y3,4 and 5 • Recognise when a written or mental strategy (with or without jottings) is more efficient **Written** • Continue as in Year 5 with the compact method. (Include carrying) • Add 2 or more numbers with more than four digits and one or two decimal places.	**Mental** • Use empty number lines as for Y3,4 and 5 • Recognise when a written or mental strategy (with or without jottings) is more efficient **Written** • Continue from Year 5 with compact method. Dealing with zero's when adjusting e.g. 4 9 13 5 0 3 - 2 7 8 2 2 5	**Mental** • Mental calculations with jottings Using factors 35 x 18 35 x 6 = 210 210 x 3 = 630 35 x 18 = 630 Using partitioning 87 x 7 = (80 x 7) + (7x7) = 560 + 49 = 609 **Written** • As in Year 5, use compact method. • Move to TUXTU Using 'carrying' 4 56 x 27 1120 392 1512 1 Extend to decimals with up to 2 decimal places	**Mental** • Mental calculations with jottings Using Factors 90 ÷ 6 = 90 ÷ 3 = 30 30 ÷ 2 = 15 Using partitioning 98 ÷ 7 = (70 + 28) ÷ 7 10 + 4 = 14 Approximate first Explain orally Using multiples of the divisor **Written** Use long method for four digit divided by two digits 6874 ÷ 23 = 298 r 20 23⟌ 6874 4600 (200x23) 2274 2070 (90x23) 204 184 (8x23) 20 Use short method ('bus stop') for four digits divided by two digits (up to 20) 1 9 9.2 13 2²5¹²8¹¹9