Bollin Primary School Calculation Policy

Year 4

Bollin Primary School

Growing hearts and minds together

Addition Guidelines

	Calculation Strategy	Questioning (adapt to use real life contexts where possible)	Vocabulary

Year 4	**+ = signs and missing numbers**
	Continue using a range of equations as in Year 1, 2 and but with appropriate numbers.
	Continue to use bar models to help understand system of addition and subtraction (commutative and distributive laws)
	
	Mental Methods
	Use a range of mental methods including partitioning both numbers, portioning one number, regrouping and renaming before adding, regrouping after adding, near doubles. These should be practiced regularly and children should be encouraged to choose the method most efficient to the sum.
	
	e.g. 85 + 34 (best method is partitioning)
	
	37 + 22 (best method is to partition the 22 only)
	
	78 + 46 (best method is regroup numbers first into 80+44)
	
	53 + 54 (best method is near double)
	
	197 + 245 (best method regroup to 200 + 242)
	
	Pencil and paper procedures **(These methods should only be used where mental methods are inappropriate)**
	
	Extend to decimals but only in the context of money or measures.
	
	Compact column addition
	Begin with 3 digit numbers then extend to numbers with at least four digits. Use PV grids and counters to introduce. Make both numbers on a place value grid before starting to add ones, tens, hundreds etc. Bringing counters down on the grid.
	
	1. First start with addition without regrouping.
	2. Then move onto regrouping and renaming the ones, then the tens then the hundreds etc.
	
	Digits will be renamed below the answer line.
		• Derive quickly all number pairs that total 100.
		62 + ■ = 100; 100 = 75 + ■; what needs to be added to 37 to make 100? 200? 500?
		• Which two identical numbers can be added to 38 to make 100?
		• □ + □ + □ = 100. If all 3 numbers are even and none of them have the same tens digit, what could the solution to my number sentence be?
		• Add 3 to 4 small numbers, find pairs totalling 10,or 9 or 11; or 20, 19, 21 etc
		4 + 1 + 7 + 9 = 10 + 11 = 21
		14 + 8 + **6** + <u>13</u> + <u>17</u> = 20 + 30 + 8 = 58
		• Use known number facts and place value to add or subtract mentally, including a pair of two-digit numbers.
		45 + 22 = ■; 76 − ■ = 51; ■ = 65 + 27; 100 = ■ + 73; 486 + ■ = 500; 8400 + ■ = 9000; 6000 − 5985 = ■; 56 = ■ + 38. Careful positioning of equal sign necessary in order for children to understand its equality.
		• Add several multiples of 10, looking for pairs which total 100. 30 + 40 + 70 = ■
		• Missing numbers within column addition:
		
		   3 6 ☐
		+ 4 ☐ 4
		   8 1 2
			+, add, more, addition, increase, plus make, sum, total altogether, double, near double, one more…, two more… ten more…, 100 more…greater, more, units, ones, tens, count, count (up) to count on (from, to) how many…? hundreds boundary, inverse.

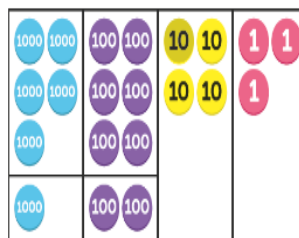Find the sum of 5608 and 1235.

Step 1   Add the ones. 8 ones + 5 ones = 13 ones
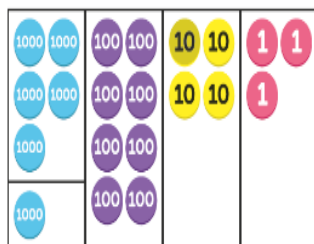   Rename the ones. 13 ones = 1 ten and 3 ones

```
    5  6  ⁰̶1  8
+   1  2  3  5
_____
             3
```
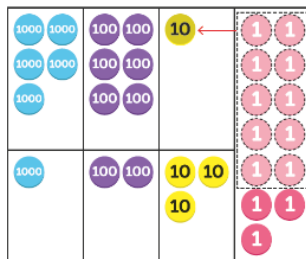
Step 2   Add the tens.
          0 tens + 3 tens + 1 ten = 4 tens

```
       ¹
    5  6  0  8
+   1  2  3  5
_____
          4  3
```

Step 3   Add the hundreds.
          6 hundreds + 2 hundreds = 8 hundreds

```
       ¹
    5  6  0  8
+   1  2  3  5
_____
       8  4  3
```

Step 4   Add the thousands.
          5 thousands + 1 thousand = 6 thousands

```
       ¹
    5  6  0  8
+   1  2  3  5
_____
    6  8  4  3
```
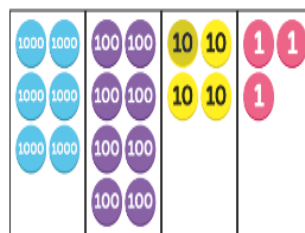
5608 + 1235 = 6843

Fractions
Add fractions of the same denominator going up to or beyond one whole - using equipment and real life situations to aid understanding. (Note; improper and mixed number fractions are not taught explicitly in this year group, answers can be expressed either as improper or mixed numbers, but the link between the 2 isn't explicitly taught)
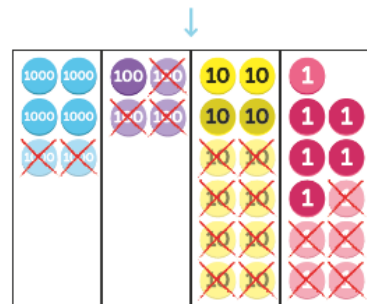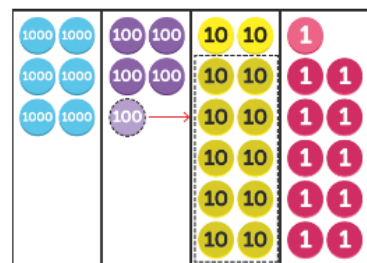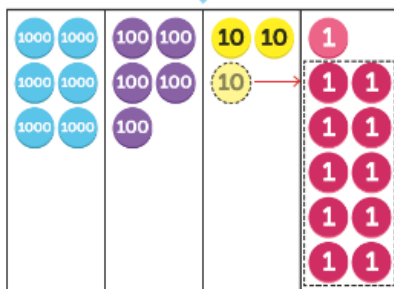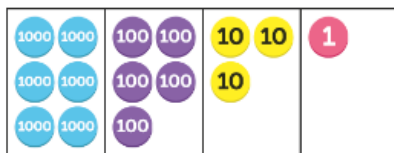
e.g $\frac{5}{7} + \frac{4}{7}$

$\frac{1}{5}$ and $\frac{3}{5}$ make $\frac{4}{5}$.

$\frac{4}{5} < 1$

1 fifth and 3 fifths

4 fifths + 3 fifths = 7 fifths

$\frac{4}{5}$ + $\frac{3}{5}$ = $\frac{7}{5}$

$\frac{4}{5} + \frac{1}{5} = 1$

$\frac{1}{5}$ $\frac{2}{5}$ = $1 + \frac{2}{5}$
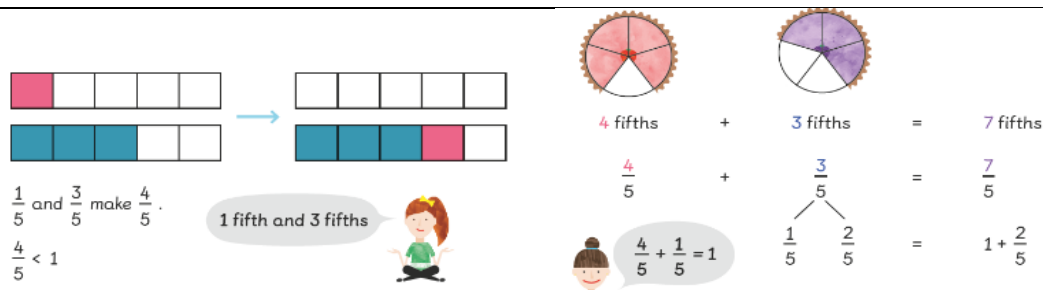
Subtraction Guidelines

	Calculation Strategy	Progression	Vocabulary
Year 4	**Mental Methods** **Find a small difference by counting up** e.g. 5003 – 4996 = 7 This can be modelled on an empty number line (see complementary addition below). Children should be encouraged to use known number facts to reduce the number of steps. **Adjust numbers for subtraction** Continue as in Year 2 and 3 but with appropriate numbers e.g 3026 – 1988 = 3038 – 2000 = 1038 Solve balancing equations. **Pencil and Paper Procedures** Continuation on previous learning, progressing to numbers up to 4 digits using the compact method with resources available to support (PV grids and counters/Dienes if not secure in PV) Children should however always be thinking; what is the best method? E.g. 2005 – 1987 should be completed mentally either by compensation or adjusting as column is inefficient here. Also, for example 3000 – 1245 it is easier to subtract one from both sides, making 2999-1244. Or take 1 and add one back at the end.	What is 5016 – 5009? What simple calculation is this equivalent to? • Use known number facts and place value to add or subtract mentally 45 + 22 = ▪; 76 – ▪ = 51; 486 + ▪ = 500; 8400 + ▪ = 9000; 6000 – 5985 = ▪ □ - 500 1012 - □ 999 2000 - □ □ - 150 + 12	subtract, subtraction, take away, minus, *decrease* leave, how many are left/left over? difference between half, halve how many more/fewer is… than…? how much more/less is…? is the same as, equals, sign tens boundary, hundreds boundary *inverse*

Subtract 2385 from 6531.

6 5 3 1

There aren't enough ones.

$\begin{array}{cccc} 6 & 5 & \overset{2}{\cancel{3}} & \overset{11}{\cancel{1}} \end{array}$

There aren't enough tens.

$\begin{array}{cccc} 6 & \overset{4}{\cancel{5}} & \overset{12}{\cancel{3}} & \overset{11}{\cancel{1}} \end{array}$

6531

6 thousands
4 hundreds
12 tens
11 ones

$$\begin{array}{r} 6\ \overset{4}{\cancel{5}}\ \overset{12}{\cancel{3}}\ \overset{11}{\cancel{1}} \\ -\ 2\ \ 3\ \ 8\ \ 5 \\ \hline 4\ \ 1\ \ 4\ \ 6 \end{array}$$

2 4 1 6

Use all the number cards above in the calculation to make an answer **MORE than 25**.

□□ − □□
‾‾

Fractions

Subtract fractions of the same denominator - using equipment and real life situations to aid understanding. (Note; improper and mixed number fractions are not taught explicitly in this year group, answers can be expressed either as improper or mixed numbers, but the link between the 2 isn't explicitly taught)

e.g $\frac{5}{7} - \frac{4}{7}$ or $\frac{9}{8} - \frac{4}{8}$ include diagrams $\frac{9}{8}$ - =

Multiplication Guidelines

	Calculation Strategy	Progression	Vocabulary
Year 4	Multiply whole numbers by 10, 100 and 1000 ensuring that children understand that numbers move around the place value chart and that the decimal place is fixed to the right of the ones. Use knowledge of relationships to regroup multiplication: e.g. I know that 16 × 4 = 8 × 8, 14 × 4 = 7 × 8 ☐ × 8 = 12 × 4 24 × ☐ = 6 × 12 (commutativity understanding needed) **Ladder Multiplication method**: TO × O and HTO × O **This follows on from the method in Year 3. This may need a quick revisit before beginning this method. Place value counters or base ten should be used to help aid understanding.** ==USE LADDER METHOD ONLY AS A STEPPING STONE TO STANDARD WRITTEN METHOD:==	• What is the product of 125 and 6? • Is 1040 a multiple of 5? How do you know? Can a multiple of 3 added to a multiple of 4 be even? Give a reason? **Exploration of number sense (Mathematical thinking)** Jennie says that is you add any multiple of 3 and any multiple of 5 your will always get a multiple of 8. Why does she think this? When is she correct? When is she incorrect? Can you reword Jennie's statement so that she is always correct? Fill in the missing numbers 4 × ☐ + 8 = 24 33 = 4 × ☐ + ☐ ☐ × ☐ + 4 = 8 x 3 + 12 Hattie has 15 toy cars. John has 4 times as many toy cars as Hattie. Zak has 3 times the amount of toy cars that John has. How many toy cars has Zak	lots of, groups of times, multiplication, multiply, multiplied by multiple of, product once, twice, three times four times, five times… ten times times as (big, long, wide, and so on) repeated addition array row, column

(a) 143 × 2 = ▢

(100) (10) (10) (10) (10) (1) (1) (1)

100 × 2 = ▢

40 × 2 = ▢

3 × 2 = ▢
_____

143 × 2 = ▢

(a) 101 × 7 = ▢

```
      1   0   1
  ×           7
  _____
              ▢
+    ▢   ▢   ▢
  _____
     ▢   ▢   ▢
```

Move onto this compact column method as soon as ladder is understood.

(a) 302 × 3 = ▢

```
      3   0   2
  ×           3
  _____

  _____
```

Depth of understanding/Mastery:

ICTmagic

? 7
× 3
8 1

Score on/off   change level

▷ next

choose a digit to start the clock

1 2 3 4 5 6 7 8 9 0

Chant 6, 7, 8, 9, 11, 12 x table and know associated division facts.

got? (Using a bar model to represent this)

▢

▢ ▢ ▢ ▢

▢ ▢ ▢ ▢ ▢ ▢ ▢ ▢ ▢ ▢ ▢
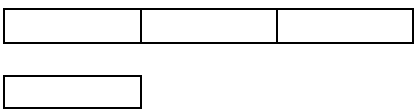
Making links
How can you use factor pairs to solve this calculation?
13 x 12
(13 x 3 x 4, 13 x 3 x 2 x 2, 13 x 2 x 6)

Division Guidelines

	Calculation Strategy	Progression	Vocabulary
Year 4	**Ensure division is taught using real contexts at all times so children understand if it is grouping or sharing and this will help them interpret the answer.** Rapidly recall division facts related to multiplication facts. Know that 7x6 = 42, so 42÷7=6 and 42÷6=7 Also know that 70 x 6 = 420, so 420÷6= 70 and 420 ÷ 6 = 70, apply knowledge to know therefore that 420÷7=60 and 420÷60=7 (This should be understood using pictorial representations and practical equipment as it is a mental calculation). **Use a number-line to support additive division (the line can also be shown vertically):** e.g. 84÷6 = 14 *[number line: 60 (10x6), 24 (4x6), from 0 to 60 to 84]* How can we use this to solve 85÷6? **USE PARTITIONG (INFORMAL METHOD) TO INTRODUCE WRITTEN DIVISION BEFORE BUS STOP METHOD. Use method as in Yr 3 or use bar model concept, shown below.** **Bar Model Method:** The broken grid lines may not be needed once understanding is gained 108 ÷ 6 60 + 48 *[bar model]* 60÷6 = 10 48÷6 = 8 **Partitioning Bubbles:**	Use the inverse to check if the following calculations are correct: 23 x 4 = 92 117 ÷ 9 = 14 **Always, sometimes, never?** Is it always, sometimes or never true that an even number that is divisible by 3 is also divisible by 6. Is it always, sometimes or never true that the sum of four even numbers is divisible by 4. **Prove It** What goes in the missing box? 6 ▭ x 4 = 512 Prove it. **Use a fact:** 63 ÷ 9 = 7 Use this fact to work out 126 ÷ 9 = 252 ÷ 7 = Bar modelling: John has 3 times as many stamps as Henry. They have 92 stamps altogether. How many stamps does each person have: *[bar model]* 92	double, halve share, share equally one each, two each, three each… group in pairs, threes… tens equal groups of divide, division, divided by, divided into, *divisible by* remainder *factor, quotient* *inverse*

$408 \div 4 =$ ▢

100 100 100 100 1 1 1 1 1 1 1 1

Method 1
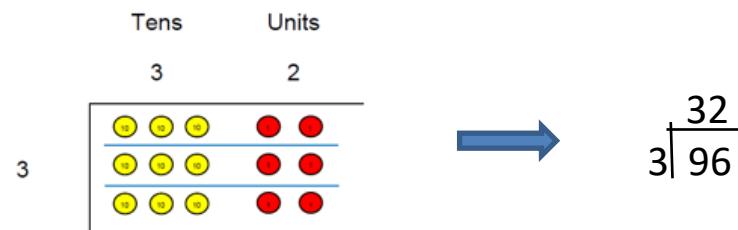
408

400   8

Divide 400.
Divide 8.

408

400   8
100   2

Introduce short division (bus stop):
Begin with divisions which divide equally with no remainder using bus stop then introduce the remainder, with numbers up to three digits by one digit.
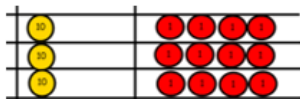
Tens   Units

3   2

3

$$\frac{32}{3\overline{\smash{)}96}}$$

Use place value counters to divide
using the bus stop method alongside

42 ÷ 3=
Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.

We exchange this ten for ten ones and then share the ones equally among the groups.

We look how much in 1 group so the answer is 14.

No remainders first:

$$
\begin{array}{r}
2\ 1\ 8 \\[2pt]
\ \ \ \ ^3 \\
\hline
4\ |\ 8\ 7\ 2
\end{array}
$$

With remainders:

$$
\begin{array}{r}
8\ 6\ \ r\ 2 \\[2pt]
\ \ \ ^3 \\
\hline
5\ |\ 4\ 3\ 2
\end{array}
$$

Continue to divide up to 4 digits by a single digit.