Bollin Primary School

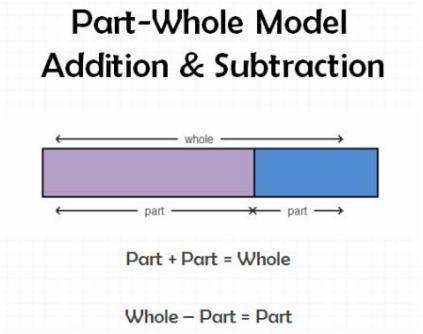
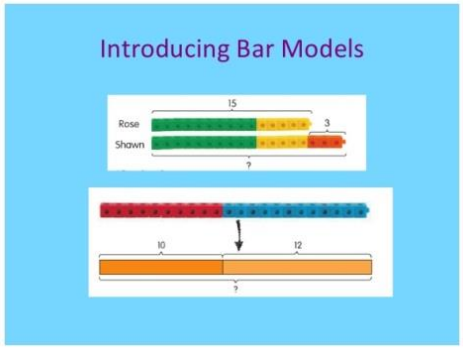
Calculation Policy

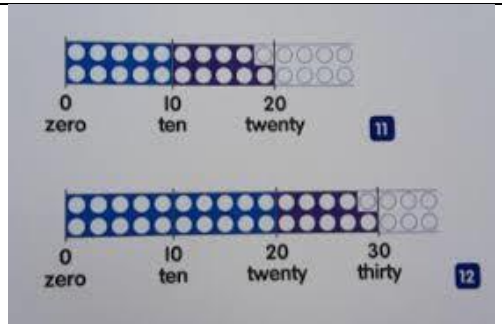
Year 2

Bollin Primary School

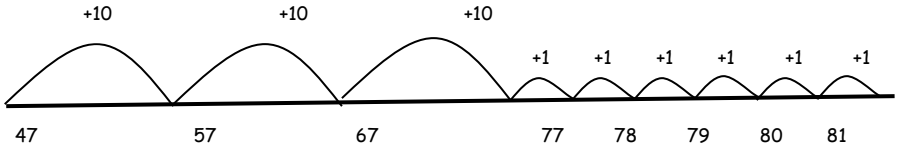
Growing hearts and minds together

Addition Guidelines

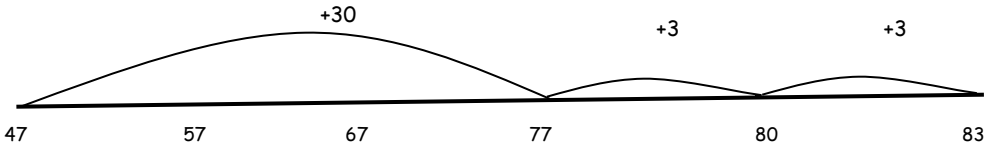
	Calculation Strategy	Questioning (adapt to use real life contexts where possible)	Vocabulary
Year 2	**+ = signs and missing numbers** Continue using a range of equations as in Year 1 but with appropriate, larger numbers. Continue to use part-part-whole model. Introduce use of bar model, initially through the use of concrete resources (cubes/tiles) and linked to a real life context.   Extend to 14 + 5 = 10 + □ and 32 + □ + □ = 100 35 = 1 + □ + 5 **The order in which children learn addition is:** • **a two-digit number and ones** • **a two-digit number and tens** • **two two-digit numbers** • **adding three one-digit numbers** Children can use a numbered line to count on in tens and ones (using physical apparatus such as Base Ten (Deanes), Numicon, Cuisenaire equipment to aid understanding)	• I thought of a number and subtracted 9.The answer was 6.What was my number? How do you know? • Find pairs of cards that total 18. • Show me on the number line how many steps you must take to get from 13 to 20, or 17 back to 13 etc. • Make as many number sentences as you can using 6, 5 and 11. • What is 43 + 9, 42 – 9, 50 –11, 25 + 19? • Jack says 35 + 6 is the same as 30 + 11? Is he correct? Why? • Jani said that he made 17 use 3 different odd numbers. Which numbers could he have used? • Kerry says she made 25 using 2 odd numbers. Explain why she cannot be correct? • I know that 35 + 8 = 43, what other information can I show using this number fact? E.g. 35 + 5 + 3 = 43, 33 + 2 + 8 = 43, 10 + 10 + 10 + 5 + 8 = 43, 37 + 8 = 43 + 2 = 45, 33 + 8 = 43 – 2 etc • Kiara says that if she knows that 45 + 12 = 57, then she also knows that 46 + 11 = 57 • Adding more than two numbers together: 12 + 11 + 16	+, add, more, addition 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…?



47 + 36



47 + 36



Addition using regrouping

Use of part-part-whole, bar model, tens frames, Numicon to aid regrouping.

e.g. 26 + 9 = 25 + 10 (by moving one from the 26 to give to the 9 to make ten)
38 + 7 = 35 +10 (by moving 3 from the 38 to make the 7 into ten)
38 + 7 = 40 + 5 (by moving 2 from the 7 to give to 38 to make 40 – understanding that this way and the way above both work – commutative law)

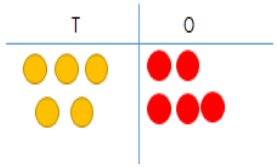
Add numbers where they cross the tens boundary using 'regrouping' prior to carrying out sum
e.g.
19 + 26 becomes 20 + 25, demonstrated using practical resources:

Partition into tens and ones – building to regrouping and renaming

No Regrouping

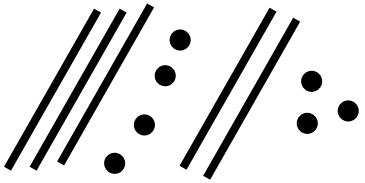
Concrete

After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.



Pictorial

e.g. 34 + 23 =



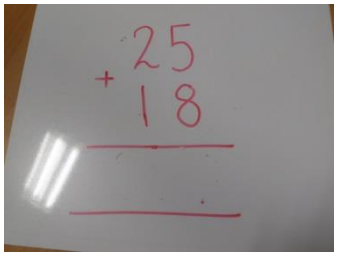
Abstract

Calculations

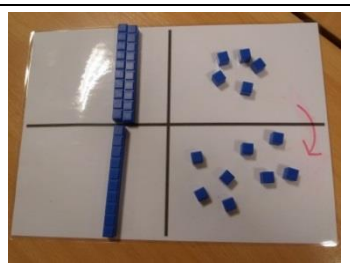
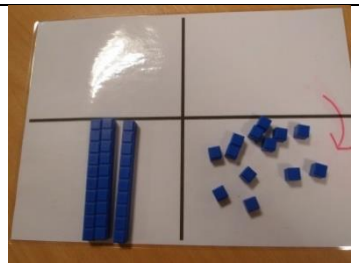
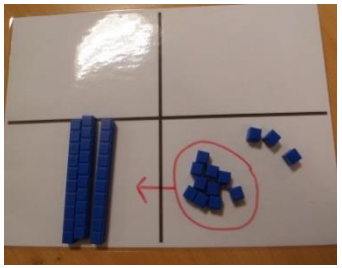
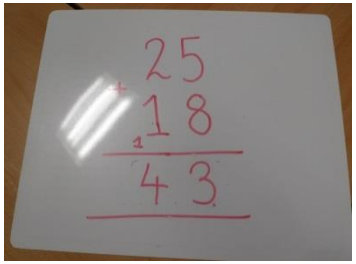
21 + 42 =

$$\begin{array}{r} 21 \\ +\ 42 \\ \hline \end{array}$$

Regrouping and renaming



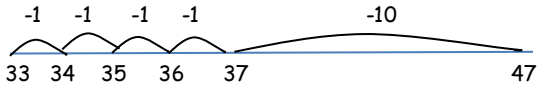
The Dienes are moved down, then regrouped into a ten when there are more than nine ones and moved into the tens column. The carried ten needs to be shown on the written algorithm at the bottom to mirror what is being shown on the grids. Similarly, children follow this procedure when required to regroup in tens,

Subtraction Guidelines

	Calculation Strategy	Progression	Vocabulary
Year 2	Subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones, a two-digit number and tens and two two-digit numbers. Children will subtract numbers with in 100. Children will be taught subtraction as – **take away, partitioning and difference (comparison)** Children will use real life experience and 'picture stories' to help them to understand the different structures. Children will be taught that subtraction is **NOT** commutative. Continue using a range of equations as in Year 1 but with appropriate numbers. Extend to 14 + 5 = 20 - □ Use partitioning for number being subtracted: e.g. 47 – 14 = 47 – 10 -4 = 37 – 4 = 33 (use a variety of visual aids to help understanding, including number	• Make as many number sentences as you can using given numerals e.g.: 6, 5 and 11. • Find pairs of cards that when subtracted give an answer of 2, 5, 10, 18 etc or ■ – ▲ = 19. What could the two missing numbers be? • Understand use of inverse operation and associated language. E.g. *I thought of a number and subtracted 9. The answer was 6. What was my number? How do you know?* • If 9 – 2 = 7, what else do you know? Extend to be able to reason beyond these digits. So if I know 9-2=7, I also know 19-2 = 17, or 19-12 = 7, 39 -2 = 37 etc children explain with reasoning. From this I can answer missing number questions:	-, subtract, take away, minus leave, how many are left/left over? one less, two less… ten less… *one hundred less* how many less is… than…? how much fewer is…? difference between half, halve =, equals, sign, is the same as *tens boundary*

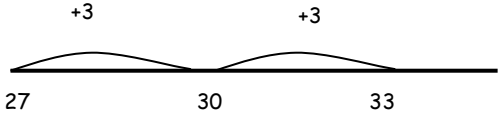
line, Base 10 equipment etc)



Counting on – this should be used when the numbers are close together (less than 10 apart) or if finding the difference.

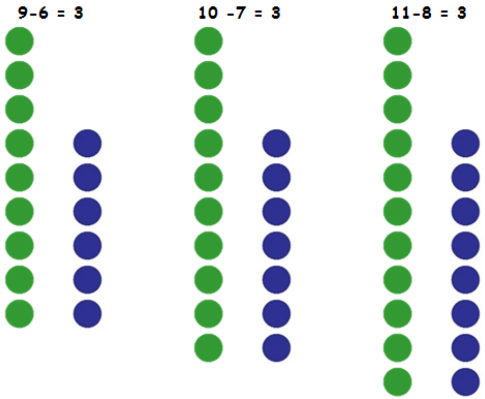
Children can now begin to 'count on' on the number line (only use appropriately when numbers are close together):

33 - 27 = 6



Explore patterns of equality using counters:

9-6=3
10-7=3
11-8=3
12-9=3
13-10=3
14-11=3



- ❖ 29 - ☐ = 19 - 12
- ❖ ☐ - 12 = 9-2
- ❖ 19 – 2 = 39 - ☐
- ❖ 89 - ☐ = ☐ - 17

- Manipulate numbers for efficiency.
  E.g.
  21 –7=24-10=14
  35-18 = 37-20 = 17
- Children begin to make choices and reason between counting on or back in subtraction – depending upon efficiency for individual calculations.
- Children understand and learn by heart all subtraction facts from 0 to 20. Children use relationship to addition to help them with this.

Understand language of subtraction and addition: e.g.: in the diagram below A is 10 more than D, C is 12 less than A. D is 16 less than E. E is worth 19. B is double D and 5 more than C.

From this children learn to <u>adjust</u> numbers for subtraction:

e.g. 14 – 9 = 15 – 10 = 5 (both digits increase to keep the difference the same)

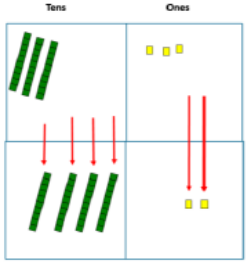
35 – 9 = 36 – 10 = 26 (both digits increase to keep the difference the same)

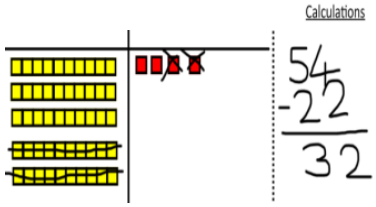
42 – 8 = 44 – 10 = 34 (both digits decrease to keep the difference the same)

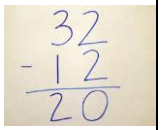
<u>Formal written methods</u>

No exchanging and renaming

Concrete →	Pictorial →	Abstract



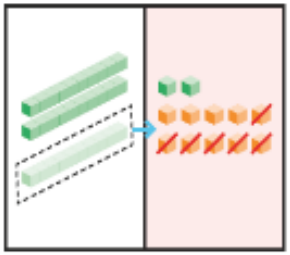




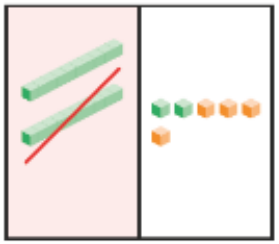
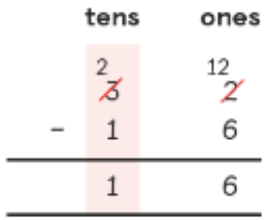
Exchanging and renaming

Subtract 16 from 32

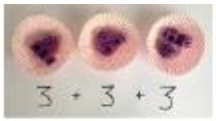
Step 1 Regroup 1 ten into 10 ones.
Subtract the ones.
12 ones – 6 ones = 6 ones



	tens	ones
	2 ~~3~~	12 ~~2~~
–	1	6
		6

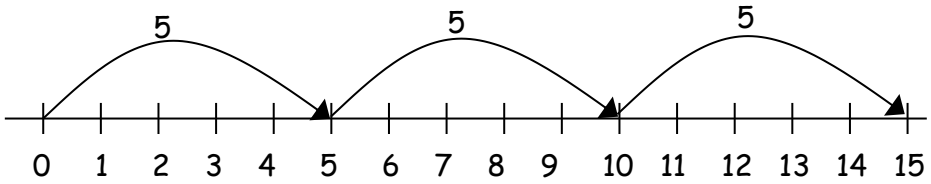
	Step 2 Subtract the tens. 2 tens − 1 ten = 1 ten  32 − 16 = 16   **WHEN USING THE PV GRIDS YOU ONLY PLACE THE LARGER NUMBER ON THE GRID, MOVING THE AMOUNT YOU'RE SUBTRACTING DOWN; LEAVING YOU WITH THE ANSWER AT THE TOP.**		

Multiplication Guidelines

	Calculation Strategy	Progression	Vocabulary
Year 2	Children will develop their understanding of multiplication and use jottings to support calculation: 3 times 5 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x 3 <u>Repeated Addition</u> Continue to use number lines and equipment to support counting in groups of numbers:    Use different objects to add equal groups.	How many sides are there on 4 triangles? Count them in 3s.• One snake is half the length of another snake which is 20 cm long. How long is the shorter snake? • I doubled 3, then doubled the answer. What number did I get? I halved this number and then halved it again. What was my answer? • Write 5+5+5+5+5+5 as a multiplication sentence Which is more 5 lots of 3 or 7+6? Jared has 3 times much money as Simone. If Simone has £4 how much money has Jared? Jared has 3 times as much money as Simone. If Simone has £4 how much do they both have in	lots of, groups of x, times, multiply, *multiplied by* *multiple of* *once, twice, three times,* *four times, five times…* *ten times…* *times as (big, long, wide and so on)* *repeated addition* *array* *row, column*

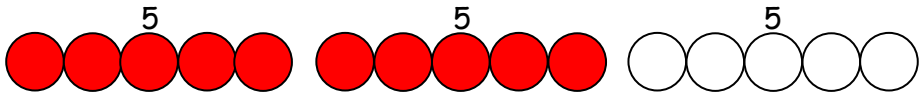
Ensure it is in real life context e.g: There are 3 plates each plate has 5 biscuits on. How many biscuits altogether?

3 x 5 = 5 + 5 + 5



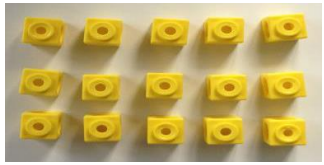
or on a bead bar:

3 x 5 = 5 + 5 + 5



Arrays

Children should be able to model a multiplication calculation using an array. Create arrays using counters/ cubes to show multiplication sentences. Also, draw arrays in different rotations to find **commutative** multiplication sentences. This knowledge will support with the development of commutative law (3x5=5x3).

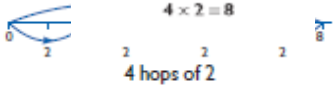


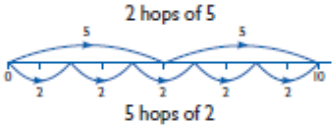
(Associativity) explore the array by looking for other calculations:

5 + 5 + 5

2 x 5 + 5

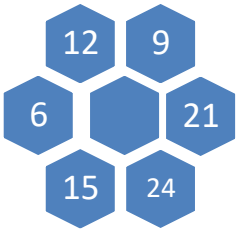
4 x 3 + 3 etc

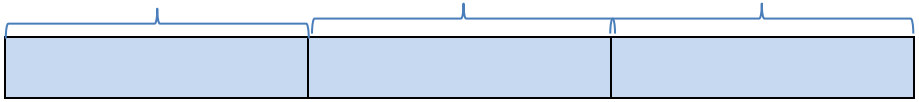




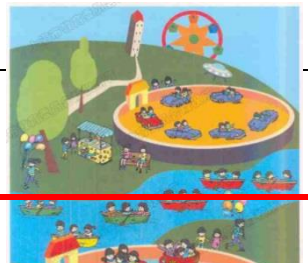
total?

Find the number that links all of the numbers around the outside of the hexagon. Explain how.

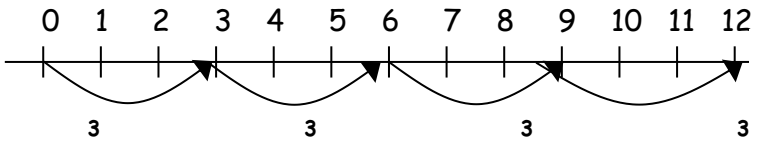


	Include bar models to represent multiplication: I have 3 packs of 6 eggs. How many eggs altogether? 6 6 6  Missing number calculations to apply and consolidate children's understanding of multiplication 1) 3 x ☐ = 12 2) ☐ x 4 = 20 3) 2 x 2 + ☐ = 10 4) ☐ x 3 – 2 = 7 5) ☐ x 2 = 5 x 4 6) ☐ x ☐ = 3 x 4 7) ☐ x 2 = 4 x ☐ Chant 2, 10, 3 and 4 x tables to ensure rapid recall.		

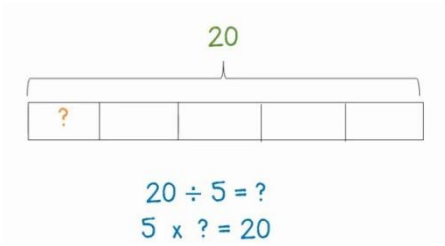
Division Guidelines

	Calculation Strategy	Progression	Vocabulary
Year 2	**Children will develop their understanding of division and use jottings to support calculation** **Sharing equally and grouping equally** **Use images to explore division:** 	• There are 18 cubes. Make 3 towers the same height. How tall is each tower? • One snake is half the length of another snake which is 20 cm long. How long is the shorter snake? 10 cupcakes fit in a cake tin, how many trays do I need for 24 cakes? Find all the division questions with an answer of 2	double, halve share, share equally *one each, two each, three each…* *group in pairs, threes…* *tens* *equal groups of* ÷, divide, *divided by, divided into*, left, left over

Additive division using a number line or bead string **12 ÷ 3 = 4**



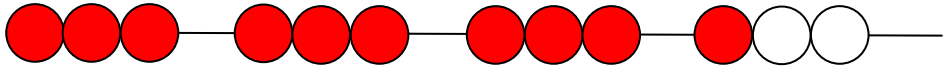
Use a bar model to support division. Thinking of the whole bar as the amount being divided:



The bead bar will help children with interpreting division calculations such as 10 ÷ 5 as 'how many 5s make 10?'

It can also show when you can't complete groups:

e.g A group of ten friends are going camping. Each tent holds 3 people. How many tents are needed? (This can be solved practically and using images or equipment such as a bead bar)



from a given set. What do you notice about the numbers used? Can you find an order for the calculations?

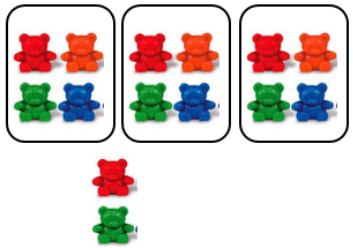
Prove It

Which four number sentences link these numbers? 3, 5, 15?
Prove it.

Making links

I have 30p in my pocket in 5p coins. How many coins do I have?

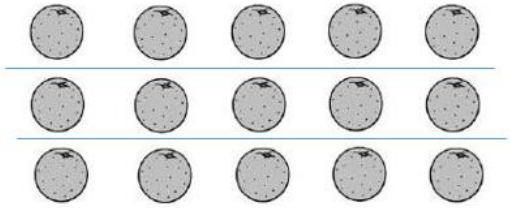
14 ÷ 3 =
Divide objects between groups and see how much is left over



Link division to multiplication and arrays:

Link division to multiplication by creating an array and thinking about the number sentences that can be created.

Eg 15 ÷ 3 = 5 5 x 3 = 15
15 ÷ 5 = 3 3 x 5 = 15



Draw an array and use lines to split the array into groups to make multiplication and division sentences.

Using symbols to stand for unknown numbers to complete equations using inverse operations

□ ÷ 2 = 4 20 ÷ △ = 4 □ ÷ △ = 4

Fractions:

Find half of quantities and express these as a fraction:

½ of 6 = 3. Ensure practical and visual equipment used (overlaying Numicon, coloured multilink, two sided counters)