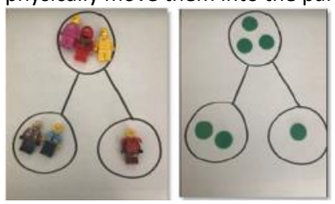
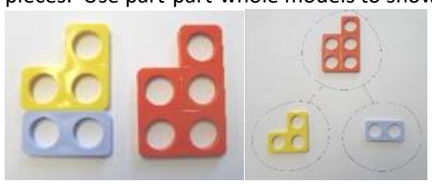
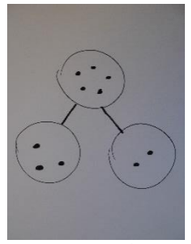
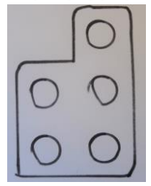
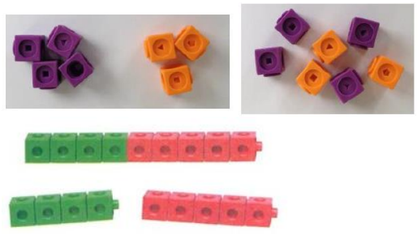
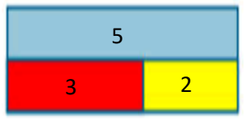
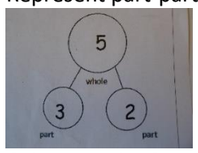
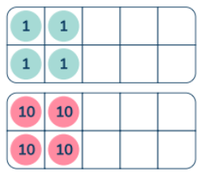
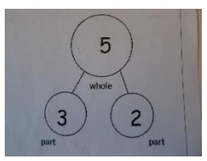
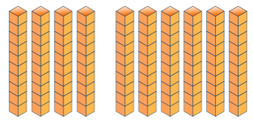
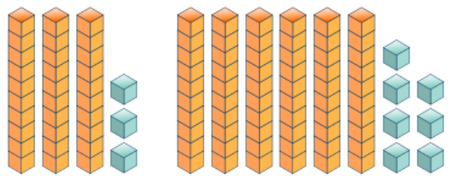
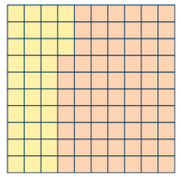
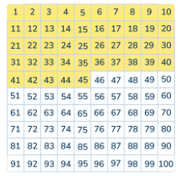
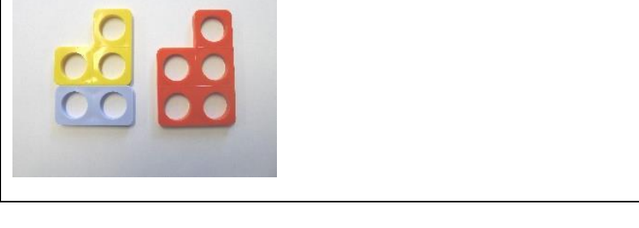
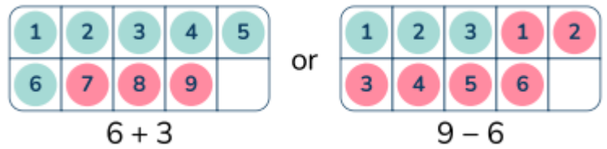
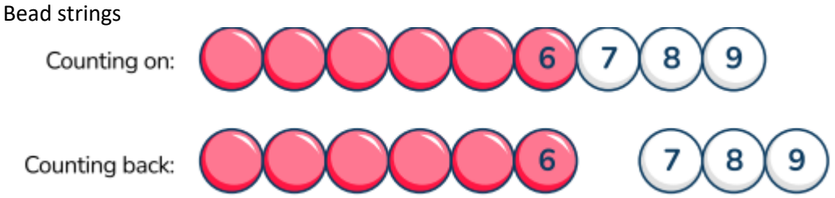
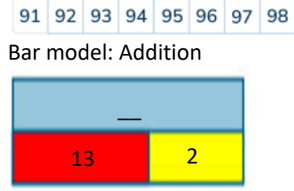
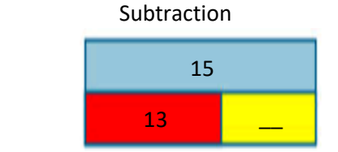
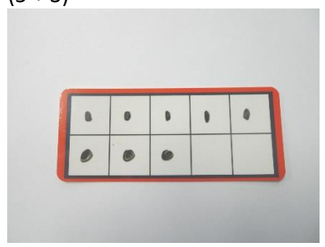
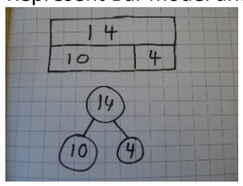
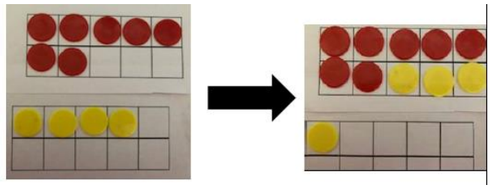
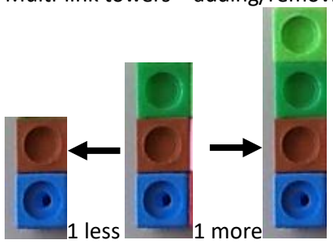
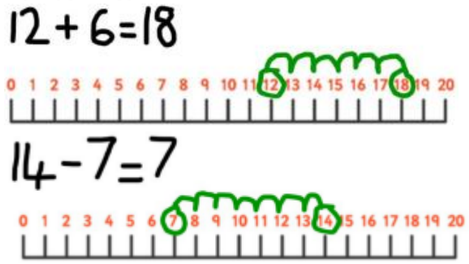
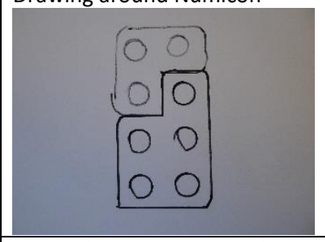
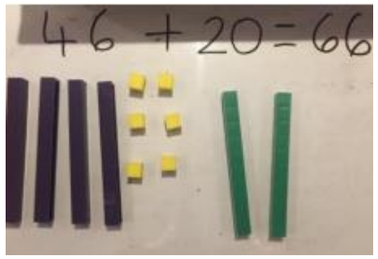
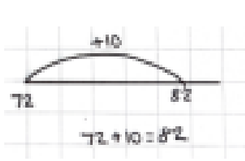
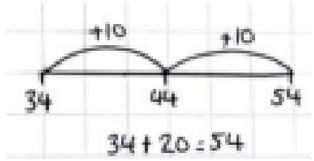
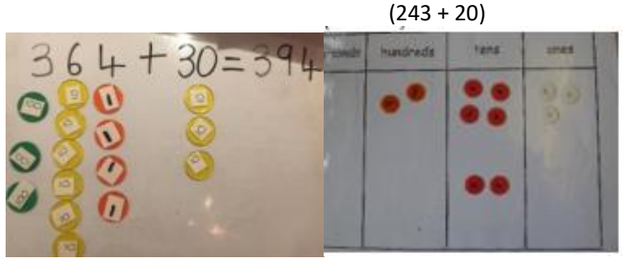
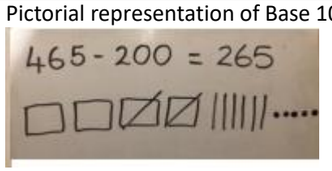
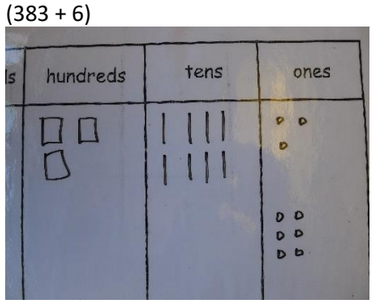
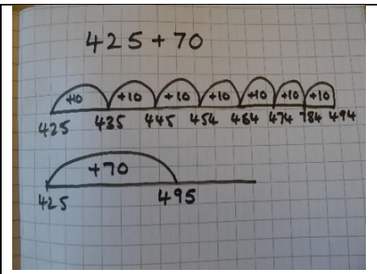
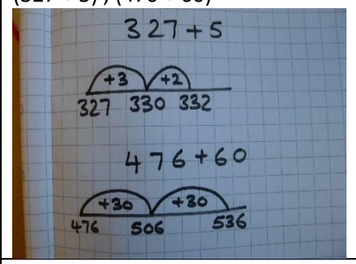
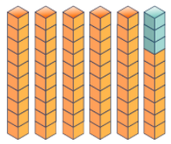
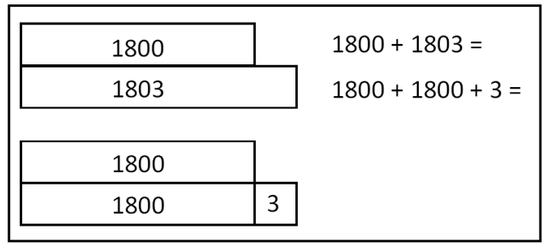
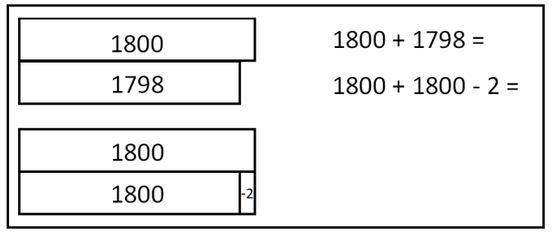
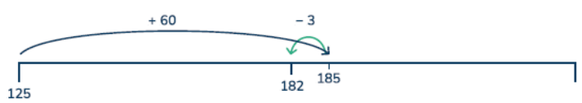
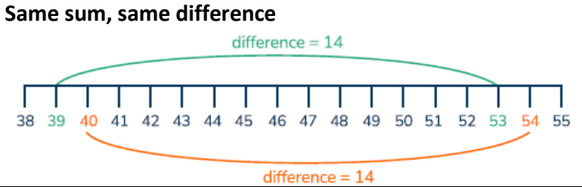
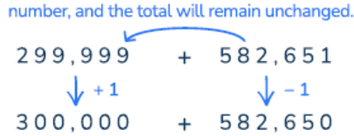
St Francis CE Primary School

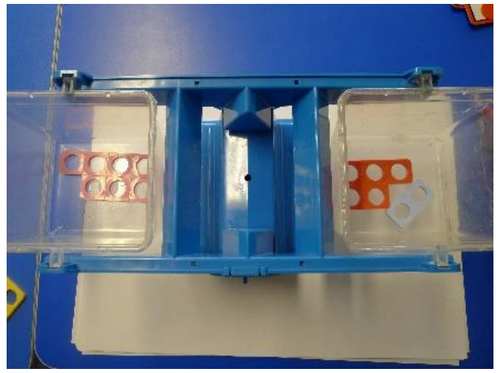
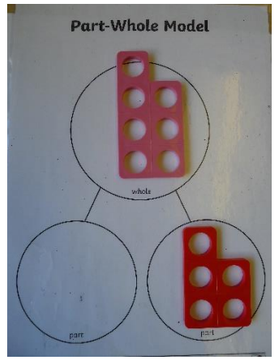
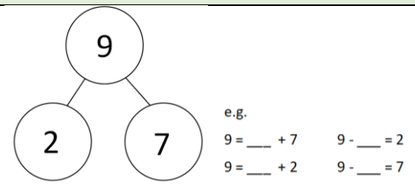
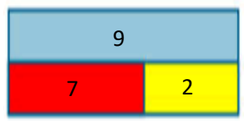
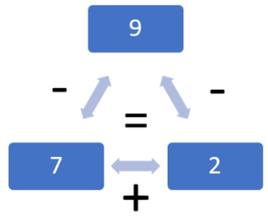
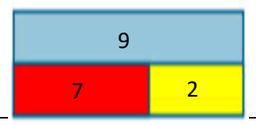
Key Models and Calculations Progression Policy – ADDITION AND SUBTRACTION

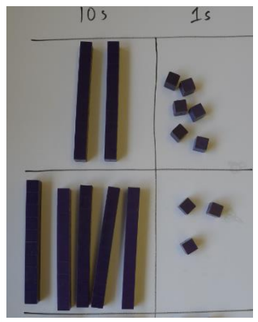
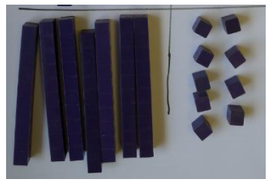
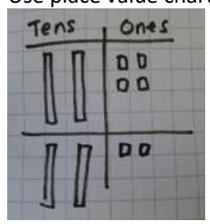
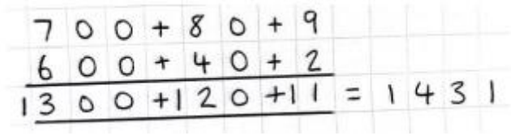
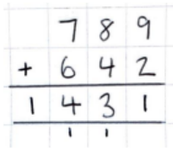
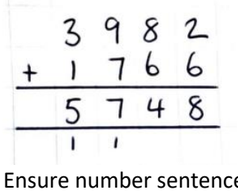
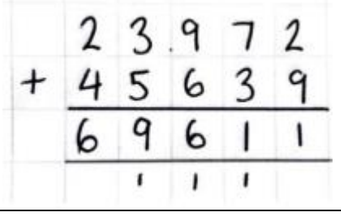
Number: Addition and Subtraction				
NC Statement	**Year**	**Concrete**	**Pictorial**	**Abstract**
Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.	R	Partition physical objects into two groups – how many ways?  Use part-part-whole models with physical objects – put the objects in the whole, physically move them into the parts. How many ways?  Use Numicon to see how you can make the Numicon shape using other Numicon pieces. Use part-part-whole models to show this. How many ways? 	Draw representations of objects e.g. three flowers and two flowers  Part-part-whole models, representing the concrete materials with marks  Draw around Numicon then cut out in different ways 	Oral (rather than written) 4 and 1 make 5 1 and 4 make 5 2 and 3 make 5 3 and 2 make 5 5 and 0 make 5 0 and 5 make 5 5 take away/subtract 1 is 4 5 take away/subtract 2 is 3 5 take away/subtract 3 is 2 5 take away/subtract 4 is 1 5 take away/subtract 5 is 0 5 take away/subtract 0 is 5
Represent and use number bonds and related subtraction facts within 20	1	As above, extending to 20. Straw bundles:  Use multilink of two different colours 	As above. Also: Introduce bar model as a different way of showing parts/whole.  	Represent part-part-whole models with numbers:  Children write 8 related number facts for a calculation (which can be displayed in visual form next to them) without calculating e.g. 2 + 3 = 5 3 + 2 = 5 5 = 2 + 3 5 = 3 + 2 5 – 3 = 2 5 – 2 = 3 2 = 5 – 3 3 = 5 – 2  or 
Recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100	2	Place value counters/ Base 10 can be used to clearly show the relationship between number pairs that make 10 and number pairs to 100.  	As above (YR/1) Also either a blank or numbered hundred square can be used to show number pairs to 100.	Represent part-part-whole models with numbers:  Recall number bonds to 20 orally, without calculating e.g. 2 + 7 = 9 13 + 3 = 16 10 – 4 = 6 15 – 2 = 13

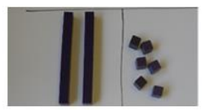
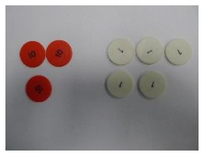
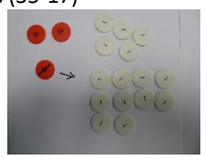
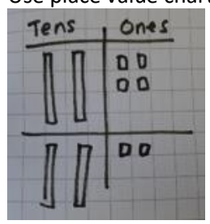
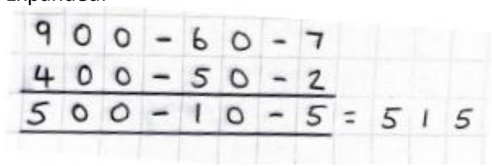
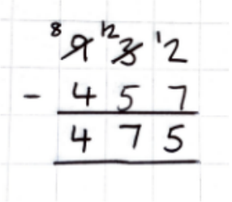
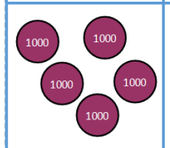
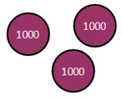
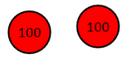
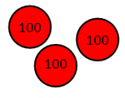
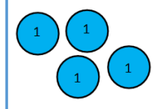
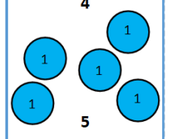
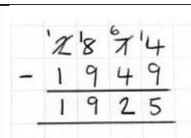
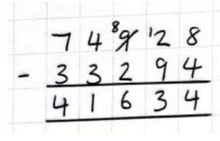
		4 + 6 = 10  40 + 60 = 100  Use Base 10 to move on to finding number pairs to 100 using their understanding of partitioning numbers into tens and ones. 33 + 67 = 100 	Shaded hundred square Either a blank or numbered hundred square can be used to show number pairs to 100.   Pictorial representation of Base 10  = 33 + 67	Recall related number facts to 100 e.g. 40+60=100 20+80=100 Children able to mentally work out pairs of numbers to make 100, using their understanding of tens and ones e.g 33+67=100 45+55=100
Add and subtract one-digit and two-digit numbers to 20, including zero.	1	Use of physical objects  Use of 10 frame  6 + 3 9 – 6 Bead strings  Base 10  Straw bundles  Numicon (3 + 2) 	Pictorial representations (jottings)   Draw in the counters on a tens frame (5 + 3)  100 Square 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 Bar model: Addition Subtraction 	Represent Bar model and Part part whole (10 + 4)  Children able to count on or back in their heads. Children solving various addition and subtraction calculations.

		Regrouping to make 10: (7 + 4) Tens frames  Multi-link towers – adding/removing 1  1 less 1 more	Number lines  Drawing around Numicon 	
Add and subtract numbers using concrete objects, pictorial representations and mentally, including: a 2-digit number and ones; a 2-digit number and tens; two two-digit numbers; adding three one-digit numbers.	2	Use Numicon (as above) Use Ten Frames (as above) Base 10 	Pictorial representation of Base 10 100 square Bar model (as above) Number lines  	Children able to count on or back in their heads. Children solving various addition and subtraction calculations e.g: Number sentences 23 + 10 = 33 20 + 12 = 32 16 + 20 = 36
Add and subtract numbers mentally including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds	3	Base 10 Place value counters and place value charts (243 + 20) 	Pictorial representation of Base 10:  Draw on Place Value chart picts (383 + 6)  Unstructured Number line (425 + 70)	Children solving various addition and subtraction calculations e.g: Number sentences (no bridging) 243 + 6 = 246 243 + 20 = 263 425 + 70 = 495 608 - 200 = 408 Number sentences (bridging) 327 + 5 = 332 476 + 60 = 536 624 + 500 = 1124

			 Bridging (327 + 5) , (476 + 60) 	
Add and subtract numbers mentally with increasingly larger numbers.	5	**Rounding and adjusting** 125 + 57 125 + 60 = 185 185 – 3 = 182 We add the nearest multiple of 10 and then adjust.  We have added 3 too many **Same sum, same difference**  16,000 – 4,469 = 15,999 – 4,468	**Near doubles**   **Rounding and adjusting**  **Same sum, same difference** 	**Known facts/fact families** E.g. 7 + 3 = 10 therefore 7000 + 3000 = 10000 3 x 7 = 21 therefore 30 x 700 = 21000 **Near doubles** 2505 + 2499 = 2500 + 2500 + 5 – 1 = 2500 + 2500 + 4 = **Rounding and adjusting** 125 + 57 125 + 60 = 185 185 – 3 = 182 **Same sum, same difference** We can give '1' from this number to the other number, and the total will remain unchanged. 
Perform mental calculations, including with mixed operations and large numbers.	6	As above, with increasingly large numbers	As above, with increasingly large numbers	As above, with increasingly large numbers

Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? – 9.	1	Numicon balance scales  (5 + ☐ = 7) Note: Numicon of the same value will balance	Numicon  Part-part whole	Developing an understanding of equality 2 + 2 = 3 + ☐ 3 + ☐ = 1 + 4 7 = 5 + ☐
Solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities, and measures.	2	As above		
Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems.	2	Numicon balance scales  (5 + ☐ = 7) Note: Numicon of the same value will balance	 Bar model:  	9 = ___ + 7 9 = ___ + 2 9 - ___ = 2 9 - ___ = 7
Estimate the answer to a calculation and use inverse operations to check answers.	3		 Bar model:  	9 = ___ + 7 9 = ___ + 2 9 - ___ = 2 9 - ___ = 7
Estimate and use inverse operations to check answers to a calculation.	4		As above.	
Use rounding to check answers to calculations and determine, in the	5	See rounding section on Number and Place Value Policy		

context of a problem, levels of accuracy.				
Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.	6			E.g. £1495 + £989 Estimate: £1500 + £1000 = £2500
Add numbers with up to three digits, using formally written methods of columnar addition.	3	Base 10   Combine tens and ones (26 + 53) Supporting the move towards formal column method	Use place value charts to add pictorially in columns  Place value charts with numbers to introduce expanded addition of 3-digits **Hundreds** | **Tens** | **Ones** 200 | 50 | 2 600 | 10 | 5 800 + | 60 + | 7 = 867 Place value charts with numbers to introduce compact addition of 3-digits **Hundreds** | **Tens** | **Ones** 2 | 5 | 2 6 | 1 | 5 8 | 6 | 7 = 867	Expanded:  Then compact:  Ensure number sentences chosen would not be more suited to an efficient strategy
Add numbers with up to four digits using the formal written methods of columnar addition where appropriate.	4	Place value counters on a place value chart **Thousands** | **Hundreds** | **Tens** | **Ones** 5000 | 300 | 20 | 7 3000 | 200 | 10 | 2 8000 + | 500 + | 30 + | 9 = 8539 If children need additional support, a place value chart can be used with base 10 to 1000. However, it is not expected that most children would need this step.	Place value charts with numbers to introduce expanded addition of 4-digits **Thousands** | **Hundreds** | **Tens** | **Ones** 4000 | 200 | 50 | 2 5000 | 600 | 10 | 5 9000 + | 800 + | 60 + | 7 = 9867 Place value charts with numbers to introduce compact addition of 4-digits **Thousands** | **Hundreds** | **Tens** | **Ones** 4 | 2 | 5 | 2 5 | 6 | 1 | 5 9 | 8 | 6 | 7 = 9867	 Ensure number sentences chosen would not be more suited to an efficient strategy
Add whole numbers with more than 4 digits including using formal written methods (columnar addition).	5	As above (PV counters on PV chart), but to 10,000 Gattengo Chart:	As above to 5-digits.	

		<table><tr><td>100,000</td><td>200,000</td><td>300,000</td><td>400,000</td><td>500,000</td><td>600,000</td><td>700,000</td><td>800,000</td><td>900,000</td></tr><tr><td>10,000</td><td>20,000</td><td>30,000</td><td>40,000</td><td>50,000</td><td>60,000</td><td>70,000</td><td>80,000</td><td>90,000</td></tr><tr><td>1,000</td><td>2,000</td><td>3,000</td><td>4,000</td><td>5,000</td><td>6,000</td><td>7,000</td><td>8,000</td><td>9,000</td></tr><tr><td>100</td><td>200</td><td>300</td><td>400</td><td>500</td><td>600</td><td>700</td><td>800</td><td>900</td></tr><tr><td>10</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td></tr><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr></table>		Ensure number sentences chosen would not be more suited to an efficient strategy
Subtract numbers with up to three digits, using formally written methods of columnar subtraction.	3	Base 10  53—27 = Exchange a 10 for 10 1s  Place value counters (35-17)   	Use place value charts to subtract pictorially in columns  Place value charts with numbers to support move to compact method of subtraction of 3-digits <table><tr><th>Hundreds</th><th>Tens</th><th>Ones</th></tr><tr><td>6 2</td><td>4 ~~5~~ 1</td><td>1 2 5</td></tr><tr><td>4</td><td>3</td><td>7</td></tr></table>	Expanded:  Initially with out carrying, and then introducing carrying. Note: ‘Give’ and ‘take’ are the terms to use rather than borrowing. Then compact (without carrying then with carrying): 
Subtract numbers with up to four digits using the formal written methods of columnar subtraction where appropriate.	4	PV chart with PV counters – exchange PV counters as required <table><tr><th>Thousands</th><th>Hundreds</th><th>Tens</th><th>Ones</th></tr><tr><td> 5000  3000</td><td> 200  300</td><td> 20  10</td><td> 4  5</td></tr></table>	Place value charts with numbers to support move to compact method of subtraction of 4-digits <table><tr><th>Thousands</th><th>Hundreds</th><th>Tens</th><th>Ones</th></tr><tr><td>4 ~~5~~ 3</td><td>1 2 3</td><td>1 ~~2~~ 1</td><td>1 4 5</td></tr><tr><td>1 +</td><td>9</td><td>0</td><td>9</td></tr></table>	 Ensure number sentences chosen would not be more suited to a more efficient mental strategy. Note: ‘Give’ and ‘take’ are the terms to use rather than borrowing.
Subtract whole numbers with more than 4 digits including using formal written methods (columnar subtraction).	5	As above (PV counters on PV chart), but to 10,000	As above to 5-digits.	 Ensure number sentences chosen would not be more suited to a more efficient mental strategy