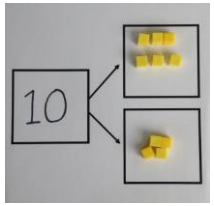
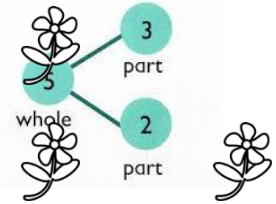
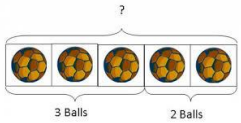
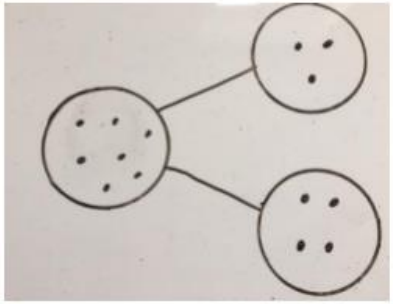
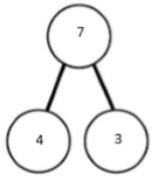
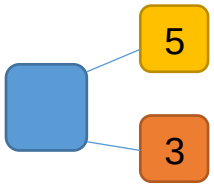
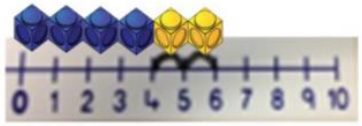
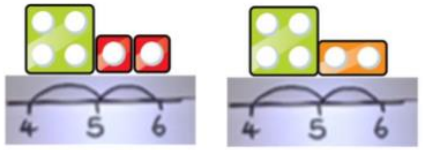
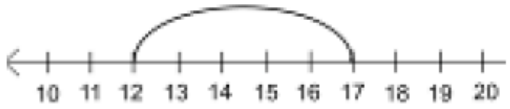
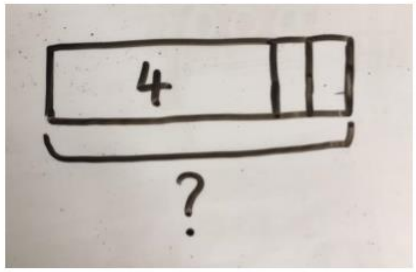
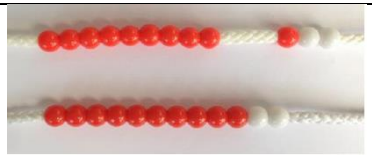
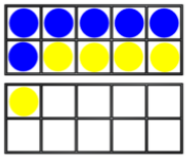
Progression in Calculations

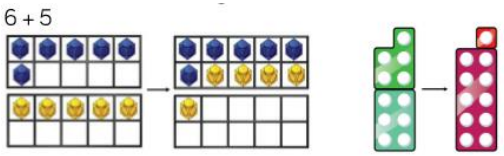
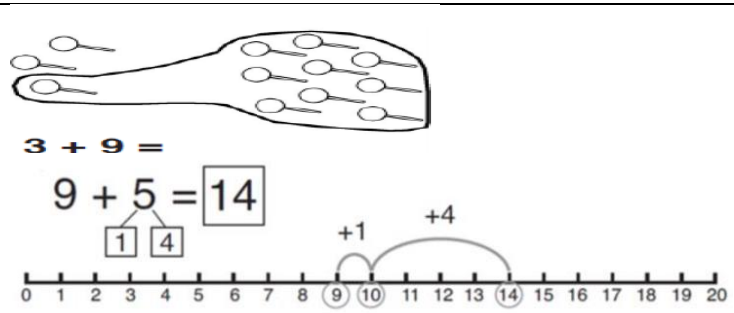
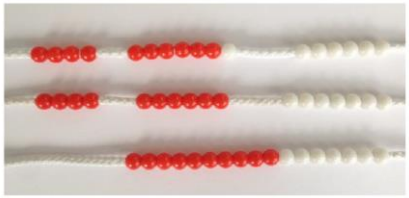
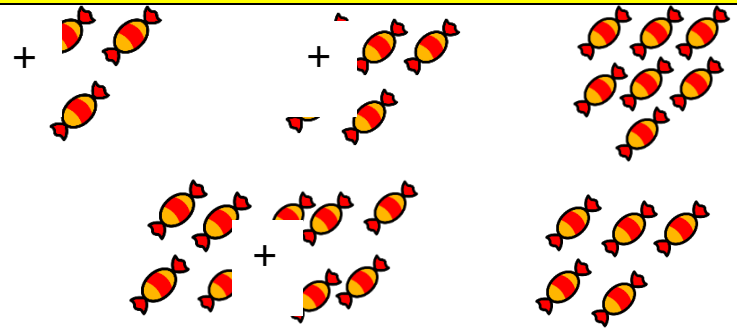
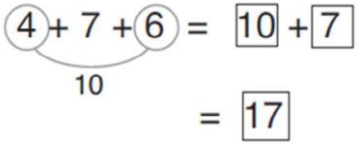
Addition Vocabulary sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as' Make More Column Addition Inverse operation, Solve problems ,Number facts, Place Value

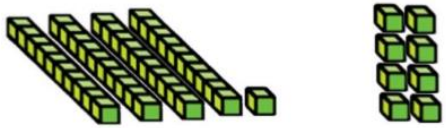
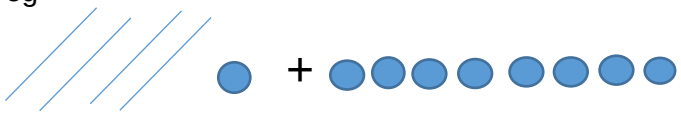
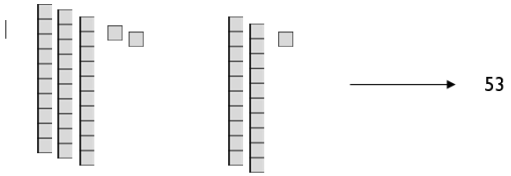
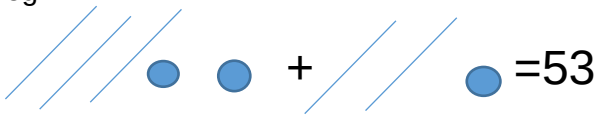
EYFS
Numbers: children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing

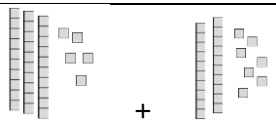
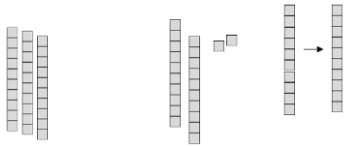
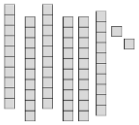
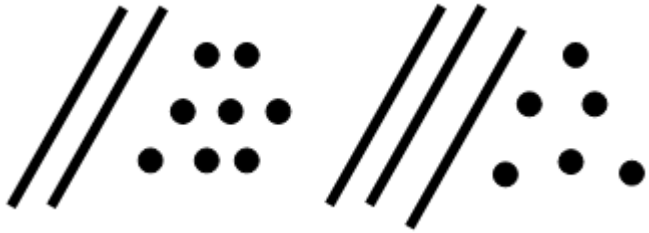
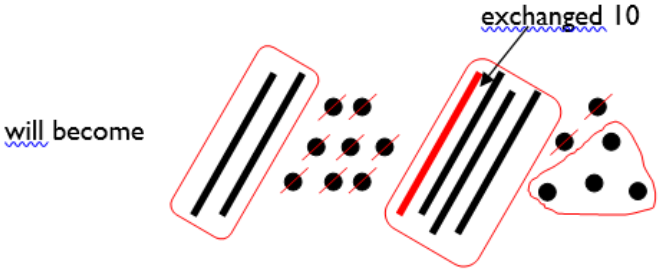
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition & Subtraction: Calculations	• add and subtract one-digit and two-digit numbers to 20, including zero Autumn 2 Spring 1	• add and subtract numbers using concrete objects, pictorial representations, and mentally, including: ➢ a two-digit number and ones ➢ a two-digit number and tens ➢ two two-digit numbers ➢ adding three one-digit numbers Autumn 2	• add and subtract numbers mentally, including: ➢ a three-digit number and ones ➢ a three-digit number and tens ➢ a three-digit number and hundreds • add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction Autumn 2	• add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate Autumn 2	• add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) • add and subtract numbers mentally with increasingly large numbers Autumn 2	• perform mental calculations, including with mixed operations and large numbers • use their knowledge of the order of operations to carry out calculations involving the four operations Autumn 2

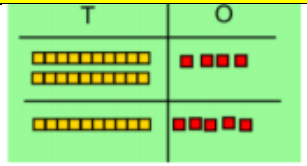
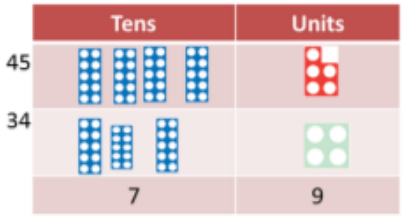
Objective and Strategies	Concrete	Pictorial	Abstract
National Curriculum Programme of Study Statements Pupils should be taught to: represent and use number bonds and related subtraction facts within 20 add and subtract 1-digit and 2-digit numbers to 20, including 0			
Combining two parts to make a whole: part-whole model **REC and Y1**	   Use cubes to add two numbers together as a group or in a bar. 	   Use pictures to add two numbers together as a group or in a bar.  Children to represent the cubes using dots or crosses. They could put each part on a part whole model too. 	4 + 3 = 7 Four is a part, 3 is a part and the whole is seven.  7= 4 +3  Use the part-part whole diagram as shown above to move into the abstract.

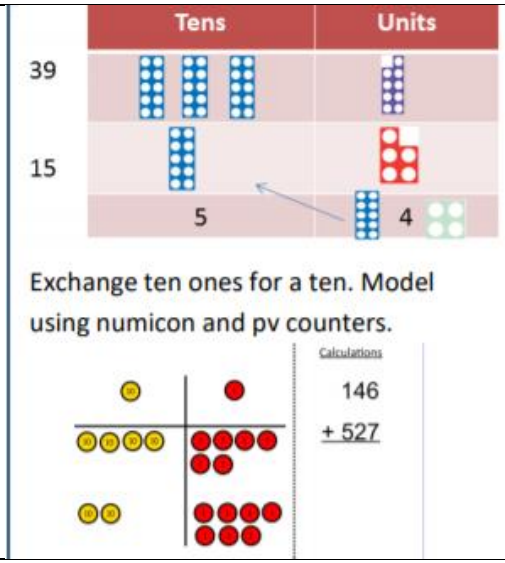
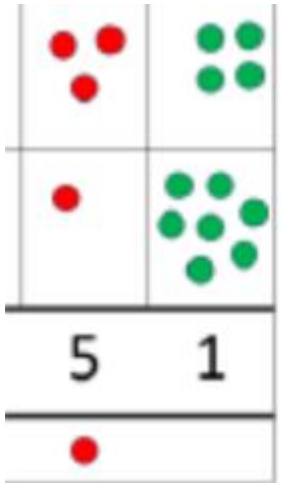
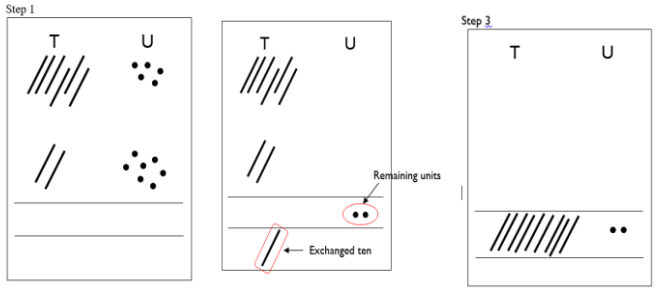
REC and Y1 Starting at the bigger number and counting on	 Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer. **Counting on using number lines** using cubes or Numicon.  	12 + 5 = 17  Start at the larger number on the number line and count on in ones or in one jump to find the answer. A bar model which encourages the children to count on, rather than count all. 	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer.
REC and Y1 and Y2 Regrouping to make 10.	 6 + 5 = 11 Start with the bigger number and use the smaller number to make 10.	Children to draw the ten frame and counters/cubes.  Use pictures or a number line. Regroup or partition the smaller number to make 10.	6 + 5 = 11 If I am at six, how many more do I need to make 10. How many more do I add on now?

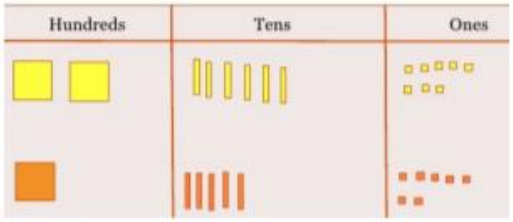
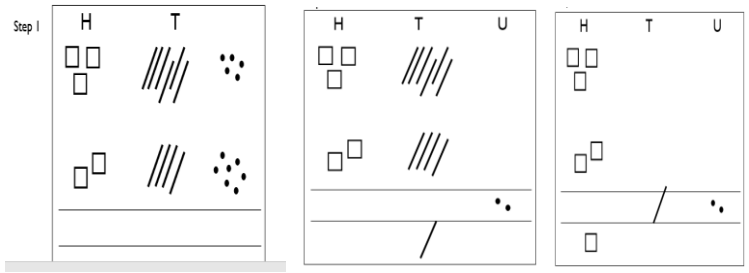
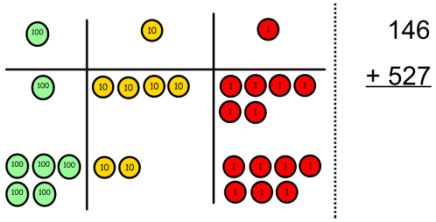
			Children to develop an understanding of equality e.g. 6 + □ = 11 6 + 5 = 5 + □ 6 + 5 = □ + 4
National Curriculum Programme of Study Statements :add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a 2-digit number and ones a 2-digit number and tens two 2-digit numbers adding three 1-digit numbers show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot			
Y2 Adding three single digits	4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7.  Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.	 Add together three groups of objects. Draw a picture to recombine the groups to make 10.	 Combine the two numbers that make 10 and then add on the remainder.

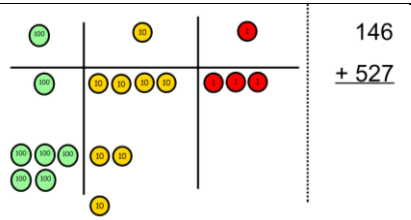
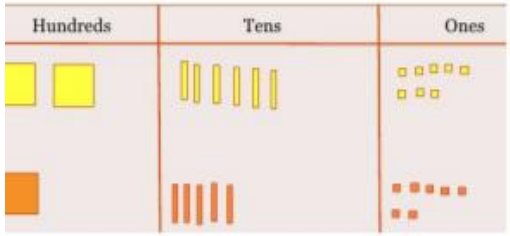
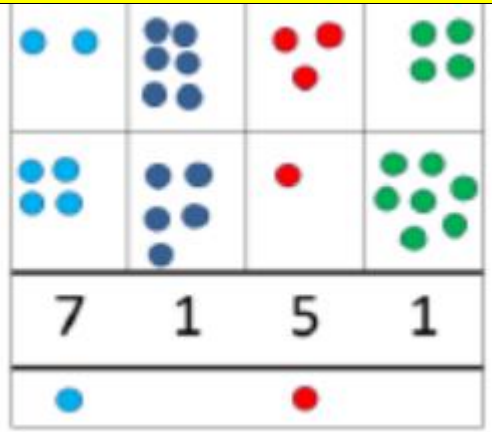
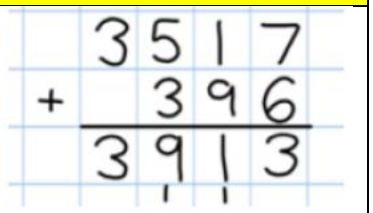
Y1 and Y2 Tens and ones +ones (T0+0)	**TO + O using base 10.** Continue to develop understanding of partitioning and place value. 41 + 8 	Children to represent the base 10 e.g. diagonal lines for tens and dots for ones. eg 	41+8=49
Y1 and Y2 Column method – no regrouping stage 1	Children will continue to use the Base 10 equipment to support their calculations. For example, to calculate 32 + 21, they can make the individual amounts, counting the ones first and then count the tens.  	Children to represent the base 10 e.g. diagonal lines for tens and dots for ones. eg  	32+21=53
Children will build on their knowledge of using Base 10 equipment from Y2 and continue to use the idea of exchange. Children should add the **least significant digits** first (i.e. start with the ones), and in an identical method to that from year 2, should identify whether there are greater than ten units which can be exchanged for one ten.			
Y2 Add two 2-digit numbers with regrouping	When the units total more than 10, children should be encouraged to exchange ones for 1 ten. This is the start of children understanding 'carrying' in vertical addition. For example, when calculating 35 + 27, they can represent the amounts using Base 10 as shown 1.	28+36=	28 + 36 = 64

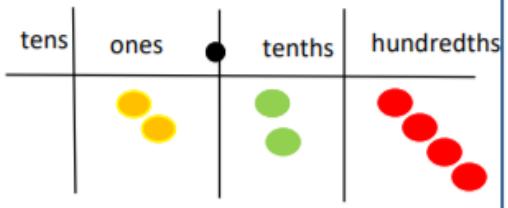
	 Then, identifying the fact that there are enough ones to exchange for a ten, they can carry out this exchange: 2.  To leave: 3. 	  It is important that children circle the remaining tens and ones after exchange to identify the amount remaining.	

Children should utilise this practical method to link their understanding of exchange to how the column method is set out. Teachers should model the written method alongside this practical method initially. This should progress to children utilising the written and practical methods alongside each other and finally, and when they are ready, to children utilising just the written method. By the end of year 3, children should also extend this method for three digit numbers.			
National Curriculum Programme of Study Statements: add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.			
Y3 Column Addition—no regrouping (friendly numbers) Add two or three 2 or 3- digit numbers using counters and numicon	 Model using Dienes or numicon Add together the ones first, then the tens. 	Children move to drawing the counters using a tens and one frame.  Children should also be able to represent the numbers using square, lines and dots as in the example below	2 2 3 + 1 1 4 3 3 7 Add the ones first, then the tens, then the hundreds.

Y3 Column method with regrouping using place value counters and numicon TO + TO		 Children can draw a rep-resentation of the grid to further support their understanding, carrying the ten **underneath** the line	20 + 5 40 + 8 60 + 13 = 73 Start by partitioning the numbers before formal column to show the exchange. 536 + 85 621 1 1
Y3 column method with regrouping TO +TO using base 10	This stage should be completed practically using base 10.	They can use a place value grid to begin to set the calculation out vertically and to support their knowledge of exchange between columns (as in Step 1 in the diagram below).e.g. 65 + 27 Step 1 Step 2 Step 3  Children would exchange ten ones for a ten, placing the exchanged ten below the equals sign. Any remaining ones that cannot be exchanged for a ten move into the equals sign as they are the ones part of the answer (as in the diagram in Step 2 above).	Written method Step 1 Step 2 Step 3 T U T U T U 6 5 6 5 6 5 + 2 7 + 2 7 + 2 7 2 9 2 1 1

		If there are any tens that can be exchanged for a hundred, this can be done next. If not, the tens move into the equals sign as they are the tens part of the answer (as in the diagram in Step 3 above).	
Y3 Column method for HTO +HTO Using base 10		Step 1 step 2 step3 	H T U 3 6 5 + 2 4 7 step 1 H T U 3 6 5 + 2 4 7 2 1 step 2 H T U 3 6 5 + 2 4 7 1 2 1 1 step 3
Column method- regrouping using place value counters HT0 +HT0	Make both numbers on a place value grid.  146 + 527 Add up the units and exchange 10 ones for one 10.	Children can draw a representation of the grid to further support their understanding, carrying the ten **underneath** the line	146 +527

	 146 + 527 Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.		
National Curriculum Programme of Study Statements: Pupils should be taught to: add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate solve addition and subtraction two-step problems in context, deciding which operations and methods to use and why.			
Y4— add numbers with up to 4 digits	~~Children continue to use dienes or pv~~ counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand. 	 Draw representations using pv grid.	

<table>
<tr><td colspan="4">National Curriculum Programme of Study Statements: Pupils should be taught to: add and subtract whole numbers with more than four digits, including using formal written methods (columnar addition and subtraction) add and subtract numbers mentally with increasingly large numbers (e.g. 12 462 – 2300 = 10 162)</td></tr>
<tr>
<td>Y5
add numbers with more than 4 digits. Add decimals with 2 decimal places, including money.</td>
<td>As year 4
 

Introduce decimal place value counters and model exchange for addition.</td>
<td>Children will draw their own place value grids and add numbers instead of counters
<table>
<tr><td>tens</td><td>ones</td><td>tenths</td><td>hundredths</td></tr>
<tr><td></td><td>2</td><td>2</td><td>4</td></tr>
</table>
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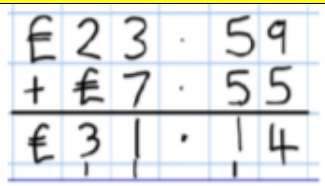
<td> 
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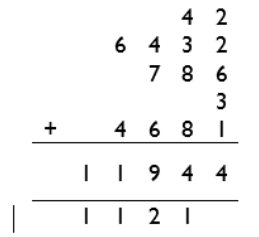
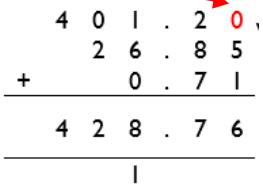
<tr><td colspan="4">National Curriculum Programme of Study Statements: pupils should be taught to: solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy</td></tr>
<tr>
<td>Y6
Add whole numbers and decimals using formal written methods (columnar addition).</td>
<td>As Y5</td>
<td>As Y5

When adding decimals with different numbers of decimal places, children should be taught and encouraged to make them the same through identification that 2 tenths is the same as 20 hundredths, therefore, 0.2 is the same value as 0.20.</td>
<td>




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