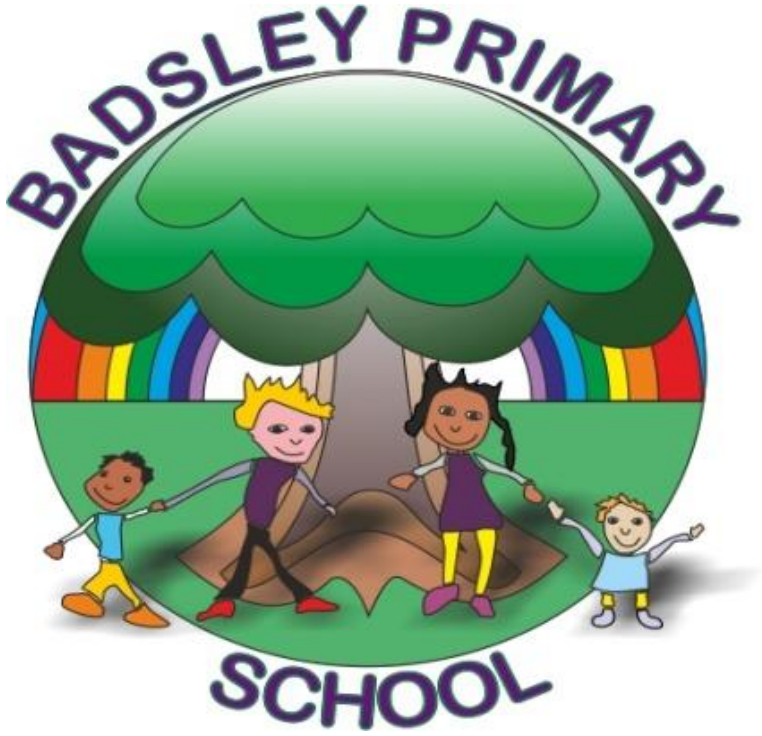
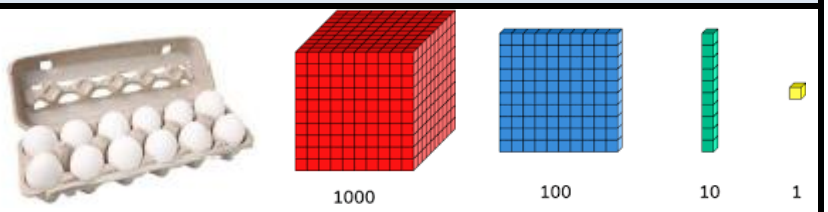
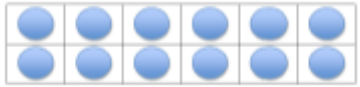
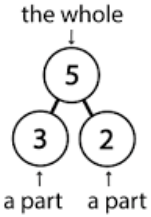


Calculation Policy / Teaching for Maths Mastery – Addition and Subtraction

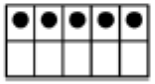
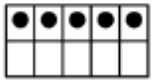
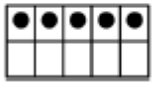
This policy has been largely adapted from the White Rose Maths Hub Calculation Policy with further materials added.

It is a working document and will be revised and amended as necessary.

Maths Working Wall – DISPLAY IT!

Concrete	Use a real-life representation of the concept which children can see, tough and feel.	
Pictorial	Show a pictorial representation of the concept.	 
Abstract	Show the mathematical representation of the concept. Using numerals helps to support learning moving from concrete and pictorial.	6 x 2 = 12 2 x 6 = 12 12 ÷ 2 = 6 12 ÷ 6 = 2 Factors of 12 are: 1, 2, 3, 4, 6 and 12
Vocabulary	Use vocabulary related to the concept. This will be adapted when moving onto new areas of learning within mathematics.	Multiply, times, repeated addition, array, divide, group, multiples, factors.

USE IT!

Foundation	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Real-life objects	Real-life objects	Real-life objects	Real-life objects	Real-life objects	Real-life objects	Real-life objects
0 – 9 digit cards	0 – 9 digit cards	0 – 9 digit cards	0 – 9 digit cards	0 – 9 digit cards	0 – 9 digit cards	0 – 9 digit cards
Number track to 10	Number line to 20	Number line to 100	Number line to 100	Number line including negative numbers	Number line including negative numbers	Number line including negative numbers
Numbered counting stick	Counting stick	Counting stick	Counting stick	Counting stick	Counting stick	Counting stick
Tens frame 	Tens frame 	Tens frame 				
	Place value charts – Tens and ones	Place value charts – Hundreds, tens and ones	Place value charts – Thousands, hundreds, tens and ones	Place value charts – Ten thousands, thousands, hundreds, tens, ones and tenths	Place value charts to a million and three decimal places	Place value charts to 10 million and three decimal places
Interlocking cubes - Use one colour to represent one amount	Interlocking cubes - Use one colour to represent one amount	Dienes	Dienes	Dienes	Dienes	Dienes
			Place value counters	Place value counters	Place value counters	Place value counters
	Place value arrow cards – tens and ones	Place value arrow cards – tens and ones	Place value arrow cards – H, T, O	Place value arrow cards – Th, H, T, O	Place value arrow cards	Place value arrow cards
Part-part-whole mat	Part-part-whole mat	Part-part-whole mat	Part-part-whole model	Part-part-whole model	Part-part-whole model	Part-part-whole model
Bar model with real-life objects	Bar model with real life objects/pictorial objects/representative objects eg. counters	Bar model with counters /Dienes progressing to numbers	Bar model with numbers	Bar model with numbers	Bar model with numbers	Bar model with numbers
Bead strings – ten	Bead strings - twenty	Bead strings - hundred	Bead strings - hundred	Bead strings - hundred	Bead strings - hundred	Bead strings - hundred
Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes
			Cuisenaire rods	Cuisenaire rods	Cuisenaire rods	Cuisenaire rods
Double sided counters	Double sided counters	Double sided counters	Double sided counters	Double sided counters	Double sided counters	Double sided counters
Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount

Progression in the use of manipulatives to support learning.

Progress in the teaching of counting in Foundation Stage.

Kinder Corner – 15 minute maths and Maths Mysteries Whole class teaching

Maths Labs in continuous provision

Expected – Number

Children count reliably with numbers from 1-20, place them in order and say which is 1 more/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.

Pre-counting

The key focus in pre-counting is an understanding of the concepts more, less and the same and an appreciation of how these are related. Children at this stage develop these concepts by comparison and no counting is involved.

Pre-counting ideas

*Provide children with opportunities to sort groups of objects explicitly using the language of **more** and **less.***

Which group of apples has the most? Which group of apples has the least?

Ordering

Count by reciting the number names in order forwards and backwards from any starting point.

Ordering ideas

Provide children with opportunities to count orally on a daily basis. Rote count so that children are able to understand number order and can hear the rhythm and pattern. Use a drum or clap to keep the beat.

One to one correspondence

One number word has to be matched to each and every object.
Lack of coordination is a source of potential error – it helps if children move the objects as they count, use large rhythmic movements, or clap as they count.

One to one correspondence ideas

Play counting games together moving along a track, play games involving amounts such as knocking down skittles.

Use traditional counting songs throughout the day ensuring children have the visual/kinaesthetic resources eg. 5 little ducks, 10 green bottles

Cardinality (Knowing the final number counted is the total number of objects)

Count out a number of objects from a larger collection. Know the number they stop counting at will give the total number of objects.

Cardinal counting ideas

How many bananas are in my fruit bowl? Allow children to physically handle the fruit.

Provide children with objects to point to and move as they count and say the numbers.

Exceeding - Number

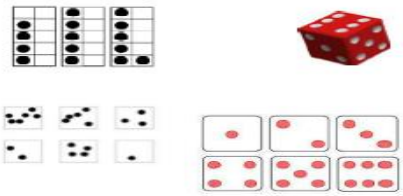
Children estimate a number of objects and check quantities by counting up to 20. They solve practical problems that involve combining groups of 2, 5 or 10 or sharing into equal groups.

Subitising (recognise small numbers without counting them)

Children need to recognise small amounts without counting them eg. dot patterns on dice, dots on tens frames, dominoes and playing cards as well as small groups of randomly arranged shapes stuck on cards.

Subitising ideas

Provide children with opportunities to count by recognising amounts.



Abstraction

You can count anything – visible objects, hidden objects, imaginary objects, sounds etc. Children find it harder to count things they cannot move (because the objects are fixed), touch (they are at a distance), see, that move around.
Children also find it difficult to count a mix of different objects, or similar objects of very different sizes.

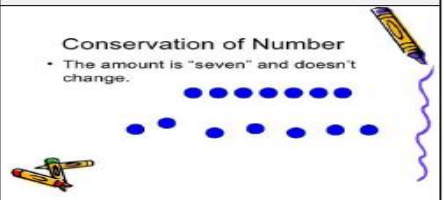
Abstraction ideas

How many pigs are in this picture?

Provide children with a variety of objects to count.

Conservation of number – MASTERY!

Ultimately children need to realise that when objects are rearranged the number of them stays the same.



F2/ Y1 ADD IT!

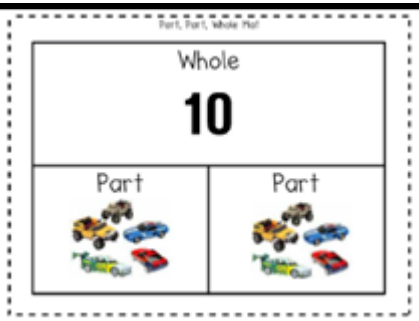
Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

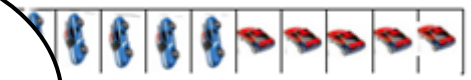
Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!

Combine two parts to make a whole model.

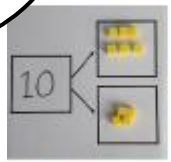
Part-part-whole model

Teach the children that the cubes/ counters represent the rea-life objects.





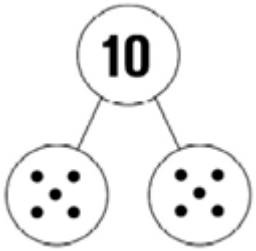
Use cubes to add two numbers together as a group or in a bar.

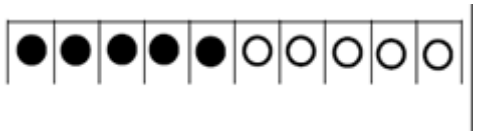


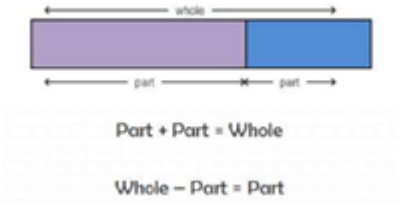
Use part part whole model.

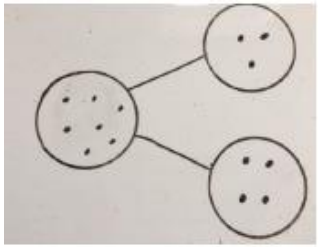
Use cubes to add two numbers together as a group or in a bar.

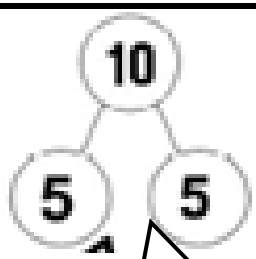
Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.











Use the part-part whole diagram as shown above to move into the abstract.

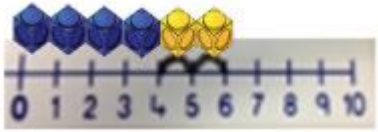
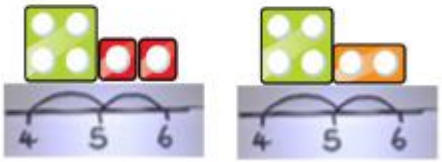
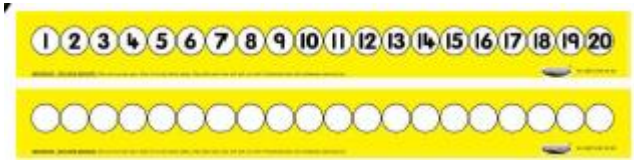
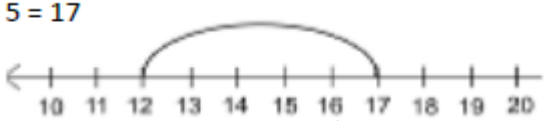
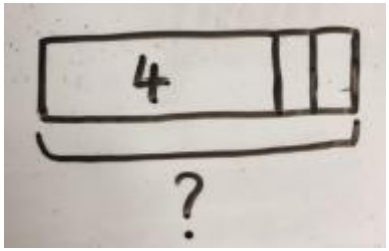
5 + 5 = 10

10 = 5 + 5

Use the term ‘number sentence’.

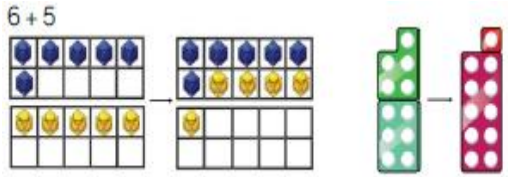
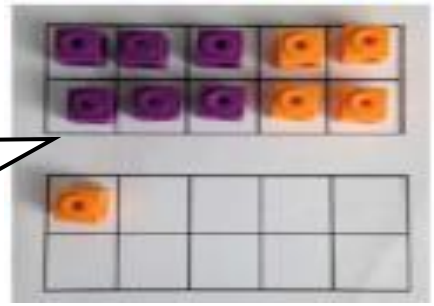
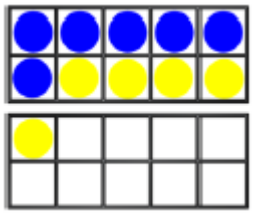
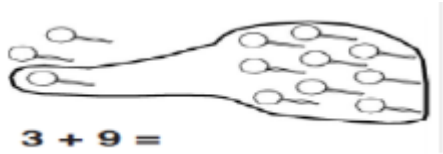
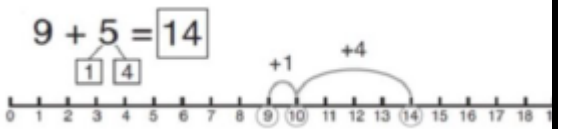
Y1 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Starting at the larger number and counting on. Counting on using number lines using cubes or Numicon.	 Start with the larger number on the bead string then count on 1 by 1 to find the answer   Use counters on a number track to count on. 	12 + 5 = 17  Start at the larger number on the number line and count on in ones to find the answer. A bar model that encourages 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. The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4+2 

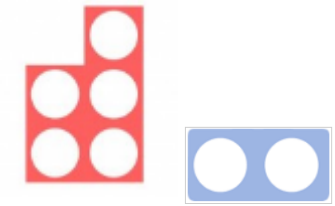
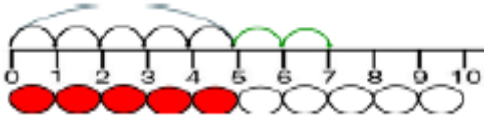
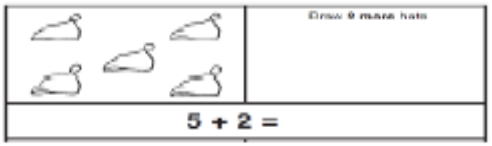
Y1 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Regrouping to make 10. This is an essential skill for column addition later. Start with the largest number and use the smaller number to make 10. Use ten frames.	Using tens frames and counters/ cubes or using Numicon.   6 + 5 = 11 	Children draw the tens frame.   Use pictures of a number line. Regroup or partition the smaller number using the part-part whole model to make 10. 	Children develop an understanding of equality. $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$ 7+4 = 11 If I am at seven, how many more do I need to make 10? How many more do I add on now?

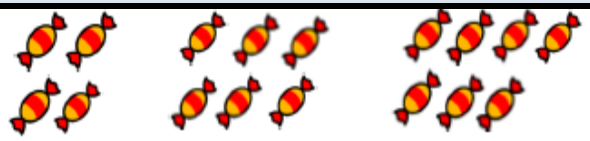
Y1 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Represent and use number bonds and related subtraction facts within 20. Use a variety of practical equipment to support this concept.	2 more than 5  	  	Put 13 in your head, count back 4. What number are you at? Use your fingers to help. Children will need regular practice counting backwards.

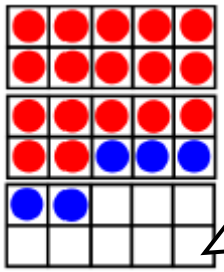
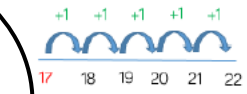
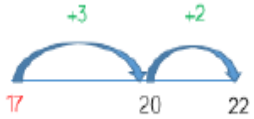
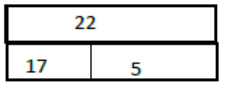
Y2 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Adding three single digits. Encourage children to use known facts.	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.*	 4 + 6 + 7 = 17 *Add together three groups of objects. Draw a picture to recombine the groups to make 10.*  Regroup and draw representation. 	4 + 7 + 6 = 10 + 7 Combine the two numbers that make 10 and then add on the remainder. Always, sometimes, never odd + odd + odd = odd Use one digit numbers to test if this is true. E.g. 3 + 5 + 7 = Which numbers would you add together first in the following number sentences? Why would you add those first? 3 + 5 + 7 = 8 + 2 + 6 = 4 + 3 + 4 = Is there always an easier order to add three one digit numbers?

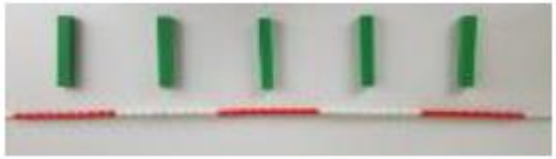
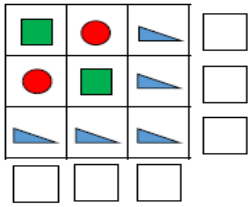
Y2 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Add a two digit number and ones	 17+5=22 Use a tens frame to make magic ten. Children explore the pattern. 17+5=22 27+5=32	17 + 5 =  Use part whole and number line to model. Use number bonds to solve the addition more efficiently.  We can partition 5 into 3 a 2 and use this to bridge the	17 + 5 = 22 Explore related facts 17 + 5 = 22 5 + 17 = 22 22—17 = 5 22—5 = 17  Here are three digit cards. 6 7 8 Place the digit cards in the number sentence. How many different totals can you find? ☐☐ + ☐ = Which is the smallest total? Which is the largest total?

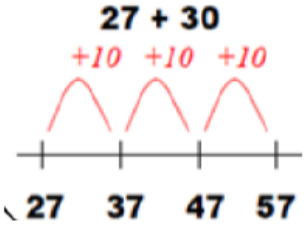
Y2 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Adding multiples of ten	 Model using dienes and bead strings.	Use representations for base 10.  3 tens + 5 tens = _____ tens 30 + 50 = _____	20 + 30 = 50 70 = 50 + 20 40 + □ = 60  Circles represent 20 Triangles represent 10 Squares represent 50 What is the value of each row and column?

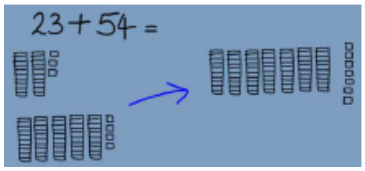
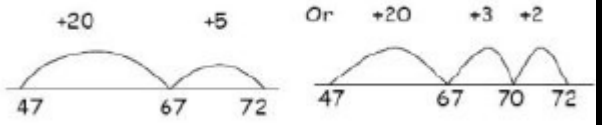
Y2 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Add a two digit number and tens	 25 + 10 = 35 Use deines. Explore that the ones digit does not change.  Use place value charts and concrete materials to answer calculations.	Draw tens and ones. IMAGE NEEDED Number line  	27 + 10 = 37 27 + 20 = 47 27 + □ = 57

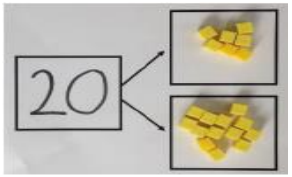
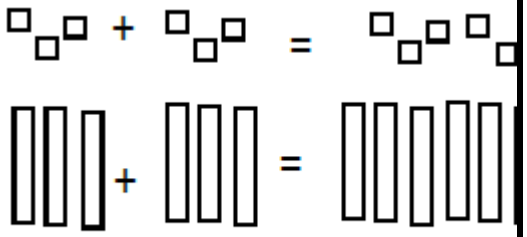
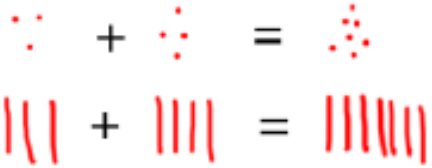
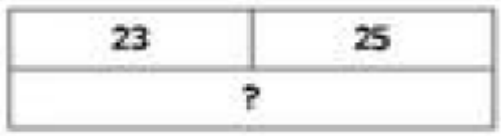
ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Add two 2 digit numbers	 Model using dienes, place value counters and numicon. 	 Draw tens and ones. Use number line and bridge ten using part whole if necessary. 	25 + 47 20 + 5 40 + 7 20 + 40 = 60 5+ 7 =12 60 + 12 = 72 What digits could go in the boxes? □2 + □5 = 87

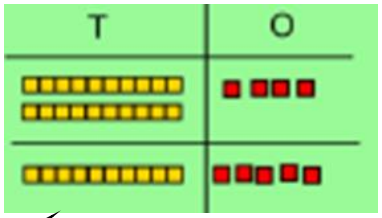
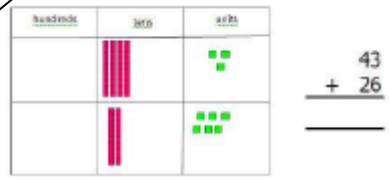
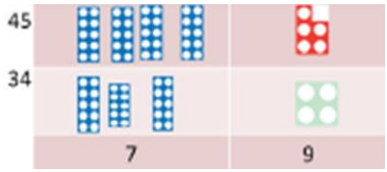
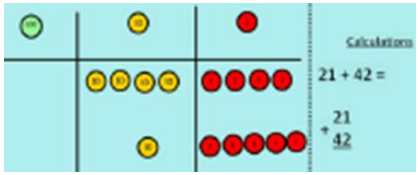
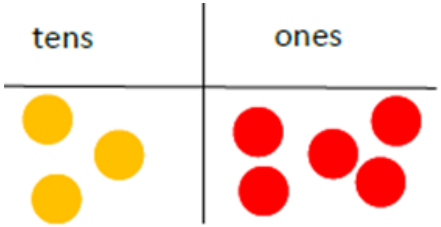
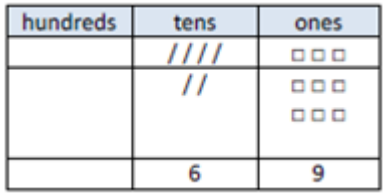
Y2 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Use known number facts Part part whole	Children explore ways of making numbers within 20. 	 □ + □ = 20 20 − □ = □ □ + □ = 20 20 − □ = □	□ + 1 = 16 16 − 1 = □ 1 + □ = 16 16 − □ = 1
Using known facts		Children draw representations 	3+4 = 7 Leads to 30+40=70 Complete the part whole models below: 
Bar model	 3 + 4 = 7	 7 + 3 = 10	 23 + 25 = 48

Y3 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

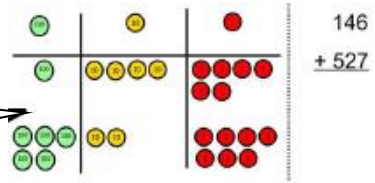
Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Column addition – no regrouping (friendly numbers) Add two 2 or 3 digit numbers. Add together the ones first, then the tens	Model using dienes or numicon.   43 + 26 _____   Move onto using place value counters.	After practically using base 10 and place value counters, children can draw the dienes or place value counters to help them solve addition calculations.   	Only select numbers which do not involve regrouping. Add the ones first, then the tens, then the hundreds. 2 2 3 + 1 1 4 _____ 3 3 7

Y3 ADD IT!

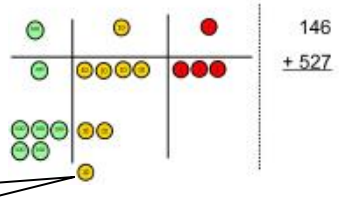
Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Column addition with regrouping.	Exchange ten ones for a ten. Model using numicon and place value counters.	Children can draw a representation of the grid to further support their understanding, carrying the ten **underneath** the line.	Start by partitioning the numbers before formal column to show the exchange.

Make both numbers on the place value grid.

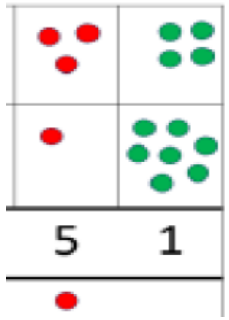


Add up the ones and exchange 10 ones for 10 and so on.



This can also be done with dienes to help children clearly see that 10 ones equals 1 ten and 10 tens equal 100.

Continue using place value counters as children begin to work with decimals.



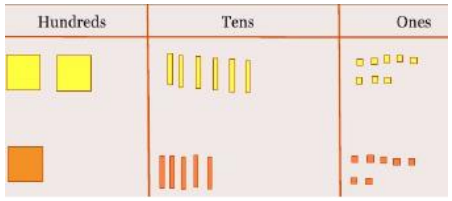
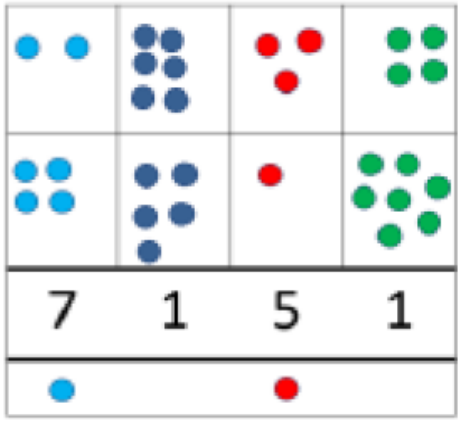
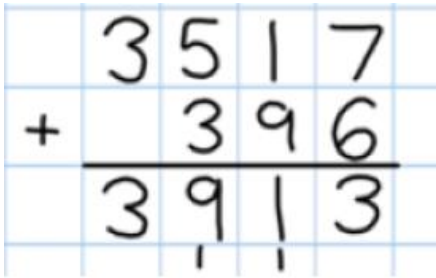
hundreds	tens	ones
/	////	□□□□□ □
/////	//	□□□□□ □□
6	6	3
	1	

$$\begin{array}{rcrl} 20 & + & 5 & \\ 40 & + & 8 & \\ \hline 60 & + & 13 & = 73 \end{array}$$

$$\begin{array}{r} 536 \\ +\ 85 \\ \hline 621 \\ 1\ 1 \end{array}$$

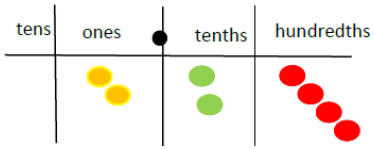
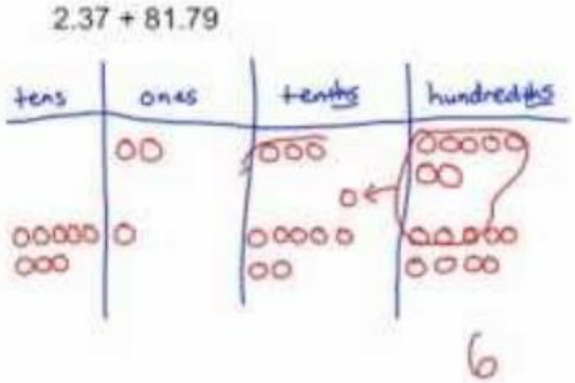
Y4-6 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Y4 add numbers with up to 4 digits.	Children continue to use deines or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand. 	Draw representations using a place value grid. 	Continue from previous work to carry hundreds as well as tens.  Relate to money and measures.

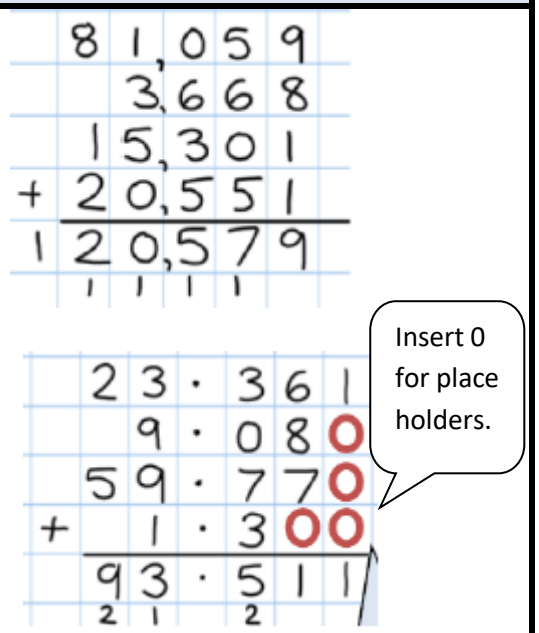
Y4-6 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

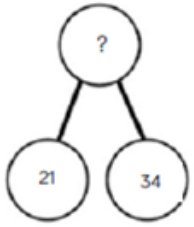
Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Y5 add numbers with more than 4 digits. Add decimals with 2 decimal places, including money.	As year 4  Introduce decimal place value counters and model exchanging for addition.		72.8 + 54.6 127.4 1 1 £23.59 + £7.55 £31.14 1 1

Y4-6 ADD IT!

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Y6 add several numbers of increasing complexity. Including adding money, measure and decimals with different decimal points.	As year 5	As year 5	

Conceptual variation; different ways to ask children to solve 21+34



?	
21	34

Word problems:

In year 3, there are 21 children and in year 4, there are 34 children. How many children in total?

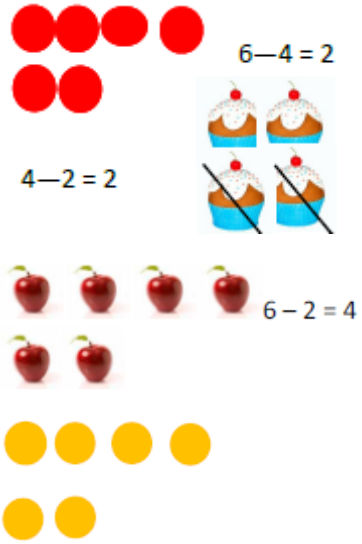
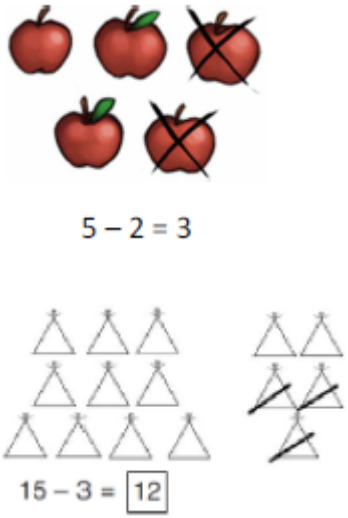
21

+34

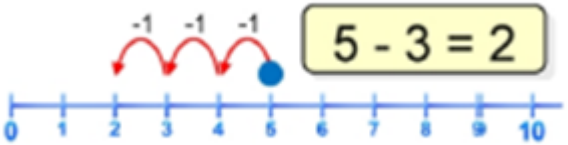
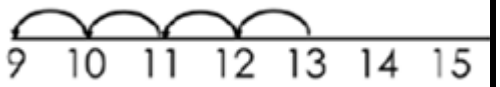
Missing digit problems:

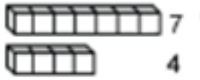
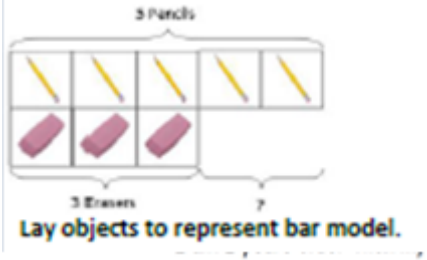
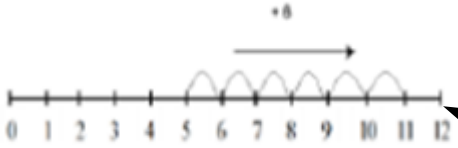
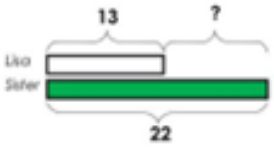
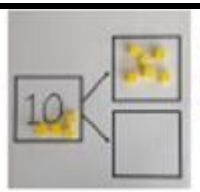
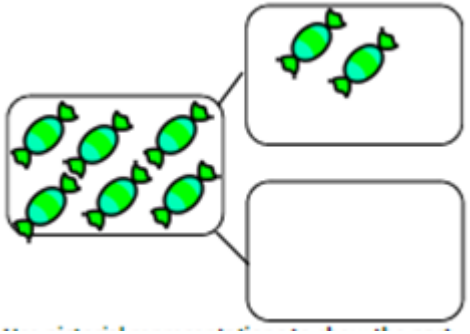
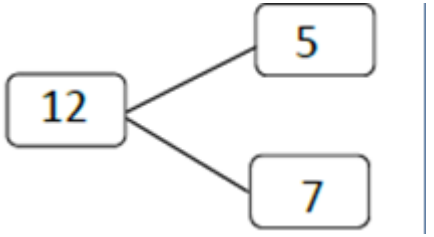
10s	1s
	
	?
?	5

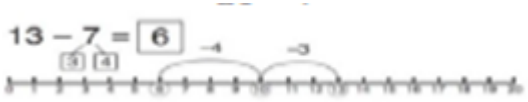
F2/ Y1 SUBTRACT IT!

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Take away ones	Use real-life physical objects, counters, cubes etc. to show how objects can be taken away. 	 Cross out draw objects to show what has been taken away.	4=6-2 18-3 = 15 8-2 = 6

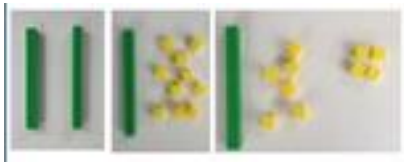
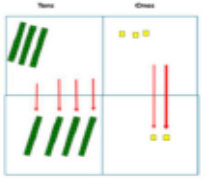
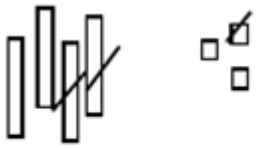
Y1 SUBTRACT IT!

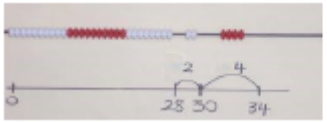
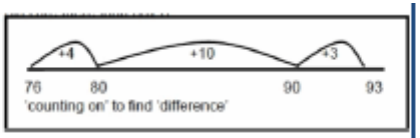
Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Counting back Use counters and move them away from the group whilst counting backwards.	 Move objects away from a group, counting backwards.   Move the beads along the bead string as you count backwards.	Count back in ones using a number line or number track.  	Put 13 in your head, count back 4. What number are you at? Children will need regular practise counting backwards.

Find the difference Use cubes to build towers or make bars to find the difference. Use basic bar models with items to find the difference.	*Compare objects and amounts.*  7 'Seven is 3 more than four' 4 'I am 2 years older than my sister'   Lay objects to represent bar model.	*Count on using a number line to find the difference.*  Count on to find the difference. *Comparison Bar Model* *Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.*  Draw bars to find the difference between two numbers.	*Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister?*
Represent and use number bonds and related subtraction facts within 20.	 Link to addition. Use PPW model to model the inverse. *If 10 is the whole and 6 is one of the parts. What is the other part?* *10-6=4*	*Use pictorial representations to show the part.* 	*Move to using numbers within the part whole model.* 

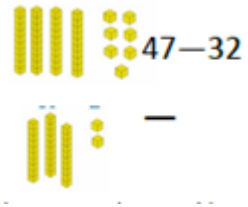
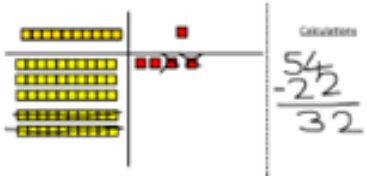
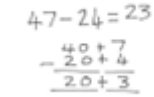
Make 10	14-9=  Make 14 on the ten frame. Take away to make ten, then take one more away so that you have taken 5.	13-7 =  Jump back 3 first, then another 4. Use ten as the stopping point.	16-8 = How many do we take off first to get to 10? How many left to take off?
Bar Model	 5—2 = 3		 10= 8+2 10= 2+8 10-2 = 8 10-8= 2

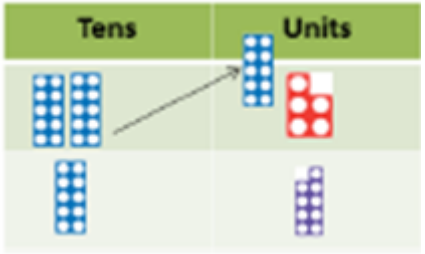
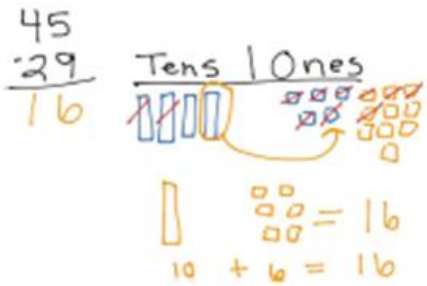
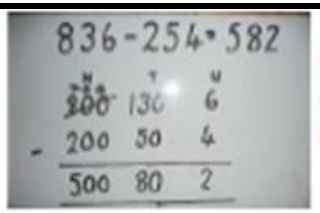
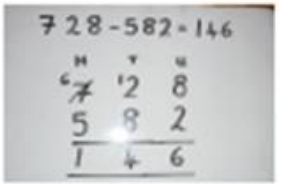
Y2 SUBTRACT IT!

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Regroup a ten into ten ones.	Use a place value chart to show how to change a ten into ten ones, use the term "take and make." 	 20 — 4 =	20—4 = 16
Partitioning to subtract without regrouping. "friendly numbers"	34-13 = 21 Use dienes to show how to partition the number when subtracting without regrouping.  	Children draw representations of dienes and cross off.  43—21 = 22	43-21 = 22

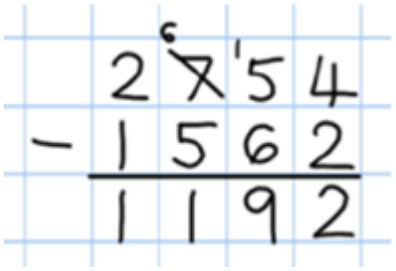
Make 10 strategy	 34—28 Use a bead bar or bead strings to model counting to next ten and the rest.	 Use a number line to count on to next ten and then the rest.	93—76 = 17

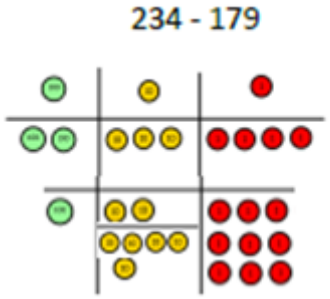
Y3 SUBTRACT IT!

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Column subtraction without regrouping. 'friendly numbers'	Use dienes or numicon to model. 	Draw representations to support understanding. 	 Intermediate step may be needed to lead to clear subtraction understanding. 

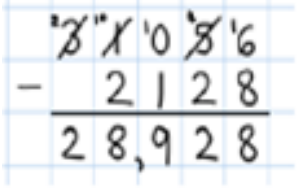
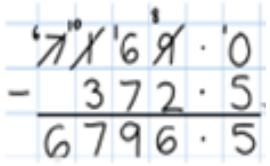
Column subtraction with regrouping.	Begin with dienes or numicon. Move to place value counters, modelling the exchange of a ten into ten ones. Use the phrase 'take and make' for exchange. 	Children may draw place value counters or dienes and cross them off. 	 Begin by partitioning into pv columns  Then move to formal method.

Y4 SUBTRACT IT!

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Subtracting tens and ones. Subtract with up to 4 digits. *Introduce decimal subtraction through the context of money.*	Model the process of exchange using numicon, dienes and then move to place value counters.	Children to draw place value counters and show their exchange – see Y3	Use the phrase 'take and make' for exchange. 

		 When confident , children can find their own way to record the exchange/ regrouping.	

Y5 SUBTRACT IT!

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Year 5 Subtract with at least 4 digits, including money and measures. Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal.	As Year 4	Children to draw the place value counters and show their exchange. – See Y3/4	 Use zeros for place holders. 

Y6 SUBTRACT IT!

Objectives and strategies	Concrete BUILD IT/ USE IT!	Pictorial DRAW IT!	Abstract SOLVE IT!
Year 6 – Subtract with increasingly large and more complex numbers.