King Athelstan Primary School

Calculation Policy

King Athelstan Primary School – Inspiring Excellence

We believe in the relentless pursuit of excellence to achieve high standards.

We are driven to inspire our school community to be aspirational, ambitious and to "dream big."

We empower children with choices which prepare them for a life of opportunity.

We teach children that hard work delivers success; we encourage children to take risks and ask brilliant questions in order to inspire a love and passion for learning.

We teach children to think.

We put children's happiness and welfare at the heart of everything we do.

We value friendship, kindness and respect.

We celebrate the excellence in each individual.

We expect families to work with us to form a strong team around every child.

We teach children to be good citizens.

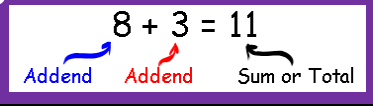
We are proud of our school: Come as you are and leave us great.

Responsibility: Maths Coordinator

Date reviewed: May 2018 **Next review date: May 2021**

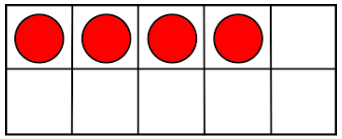
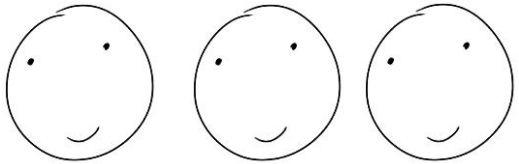
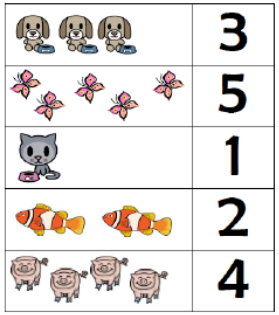
Calculation policy: Addition

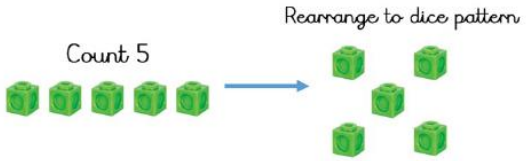
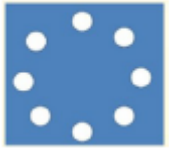
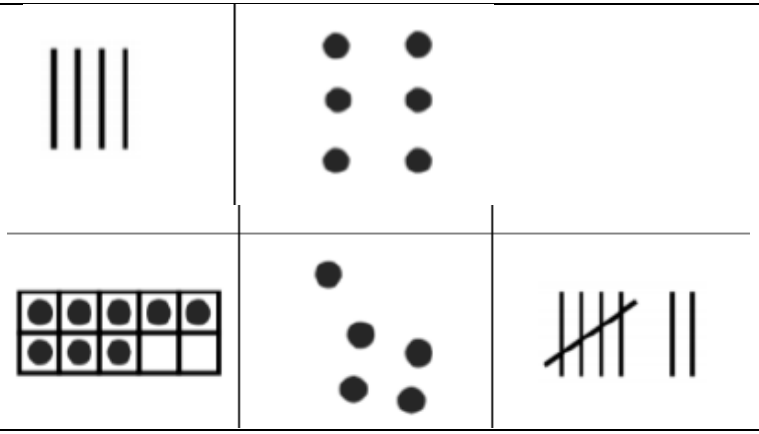
Key language: sum, total, parts and wholes, plus, add, altogether, more, is equal to, is the same as, addend aggregation (combining two amounts), augmentation (add to an amount)

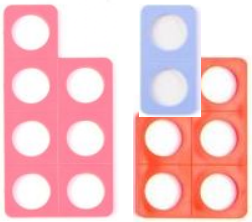
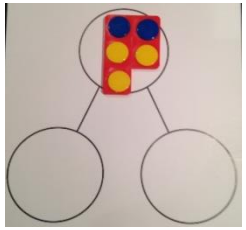
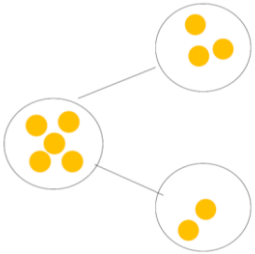
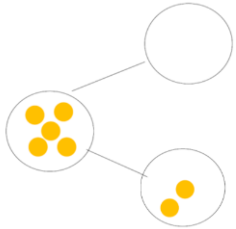


EYFS

- Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.

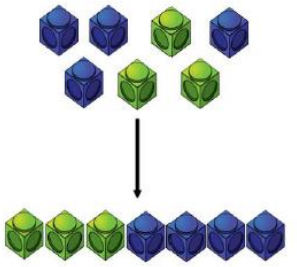
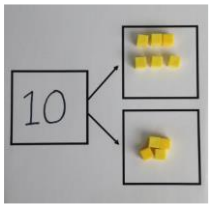
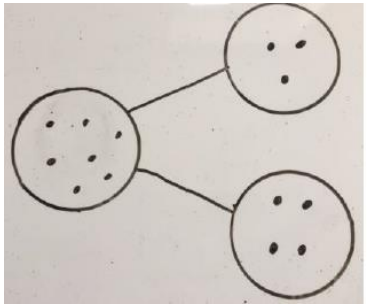
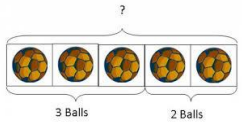
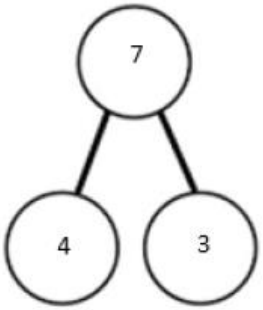
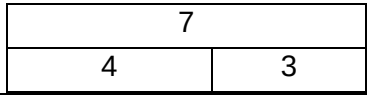
Concrete	Pictorial	Abstract
Children learn that each object is counted once and the last number is the total for the set—count small sets in irregular arrangements. Putting the objects in clear lines to help with 1:1 correspondence Using cubes to understand and manipulate quantities.   Use ten frames to count objects, to support quick recognition of numbers. Move on to using counters. 	Can children count pictures of objects and draw their own pictures of a given number.  	Children relate the number of objects to the numeral 

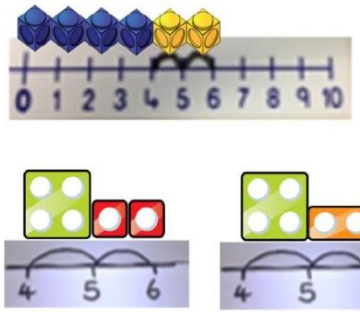
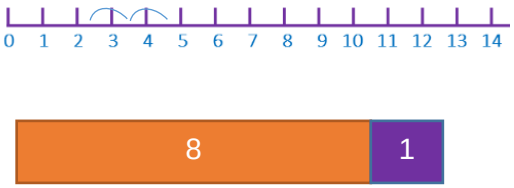
Counting objects 1:1 correspondence 		
Children count out items from larger set; objects that can't be moved; 		Make objects not visible once counted; count movements and sounds. 
Cardinality – value of 5 Children match numerals to different representations of number for quantities 1-10 (see 'knowledge of numbers as quantities') e.g. making and finding 5 in different ways. Children learn that 'teen' represents 10 and match teen/ten visual cards. 		
Composition Use numicon to understand how numbers can be made. Using knowledge of numbers are 5 and a	Representing it in a part part whole model 5 is the whole, 2 is a part and 3 is a part 2 is a part, 3 is a part and the whole is 5.	Identify what's missing How many more do I need to make the whole?

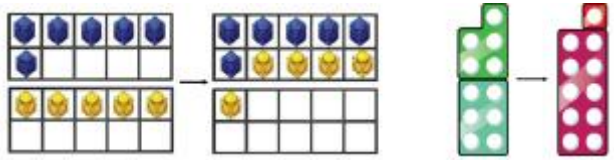
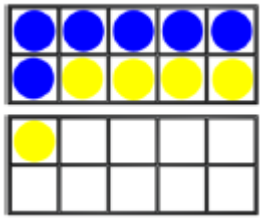
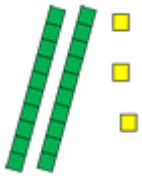
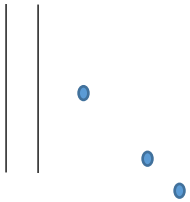
bit, so they count on from 5, not always from 0. 7 is the whole, 5 is a part and 2 is a part 5 is a part, 2 is a part and 7 is the whole  	 	

Band 1

- Add and subtract one-digit and two-digit numbers to 20, including zero

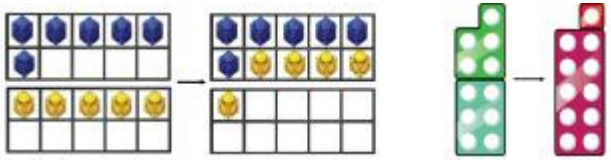
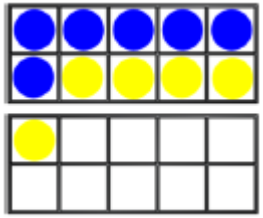
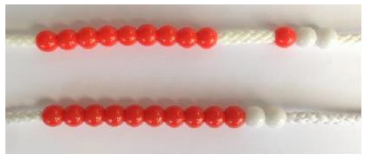
Concrete	Pictorial	Abstract
Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars).    Exploring the number bonds for each number up to 10, then 20.	Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.    	4 + 3 = 7 Four is a part, 3 is a part and the whole is seven.  Children to link this to the bar model. 

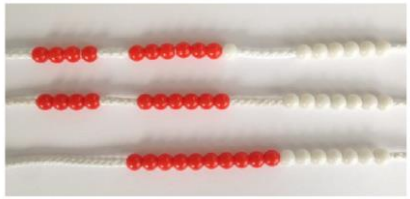
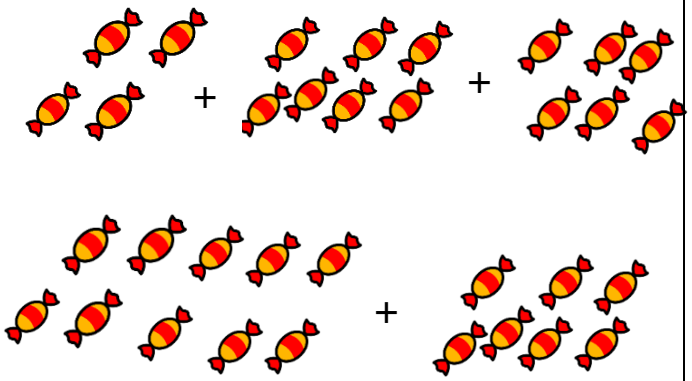
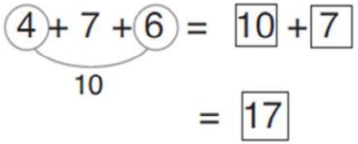
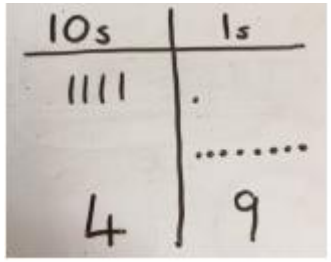
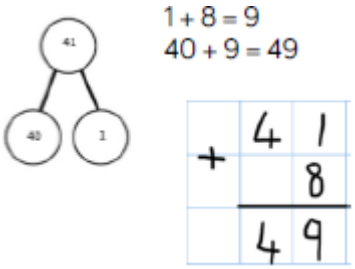
Counting on using number lines, using cubes or Numicon.  	Children to count on using a number line.  	Children to draw their own number line. What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4 + 2 

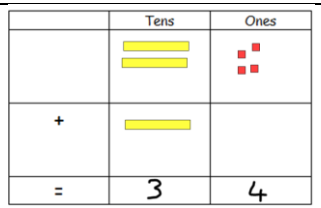
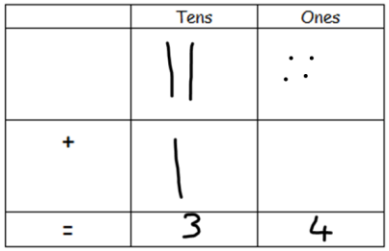
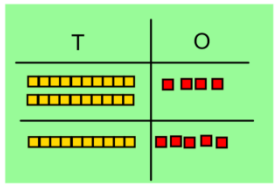
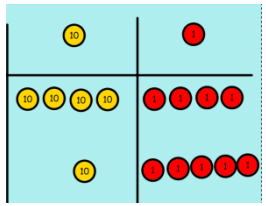
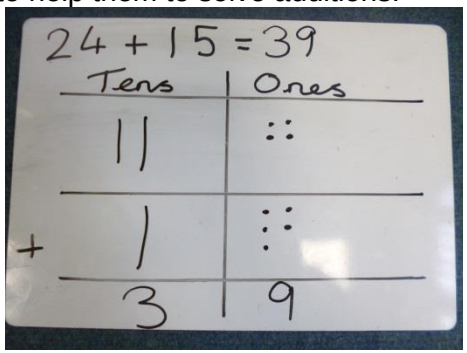
Regrouping to make 10; using ten frames and counters/cubes or using Numicon. 6 + 5 	Children to draw the ten frame and counters/cubes. 	
Understanding place value Use straws, multi-links, dienes  	23 = 20 + 3 23 has 2 tens and 3 ones 	34 = 30 + 4 34 = 3 tens and 4 ones

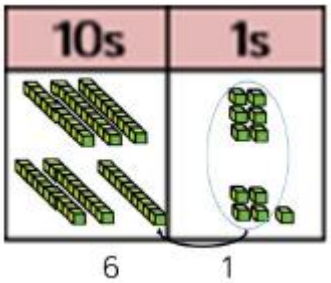
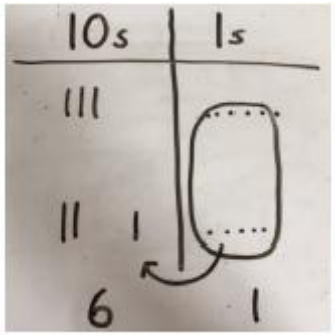
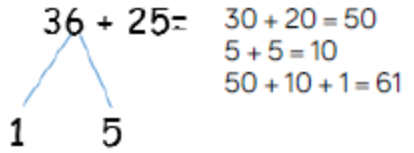
Band 2

- 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

Concrete	Pictorial	Abstract
Regrouping to make 10; using ten frames and counters/cubes or using Numicon. 6 + 5 	Children to draw the ten frame and counters/cubes. 	
Children to use a bead string to regroup or partition the smaller number to make 10. 	Children to use a number line to bridge through ten. Regroup or partition the smaller number to make 10. 9 + 3 = 12 1 2 +1 +2  Children to draw their own blank number line. +1 +2 9 10 12	Children to develop an understanding of equality e.g. $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$

Adding three one-digit numbers 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. 
TO + O using dienes. Continue to develop understanding of partitioning and place value. 41 + 8   Use straws to help children understand the value of 'ten'	Children to represent the dienes e.g. lines for tens and dot/crosses for ones. 	41 + 8 = 49 If and when, children are ready, represent this on the column method. 
TO + T 24 + 10 = 34	24 + 10 = 34	24 + 10 = 34

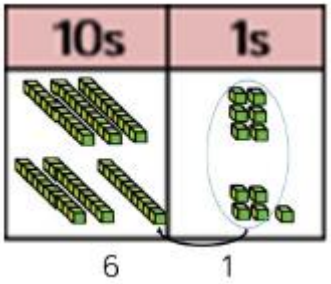
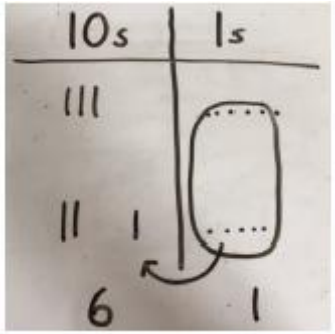
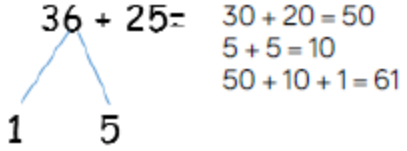
 Partition the numbers into tens and ones using Dienes blocks. Add together the ones first then add the tens. Finally add the 2 totals together. Position in a grid to support movement to column method. Recognise which digits are changing.	 After practically using the Dienes blocks and place value counters, children can draw the counters or dienes to help them to solve additions.	
TO + TO Addition without regrouping Partition the numbers into tens and ones using Dienes blocks. Add together the ones first then add the tens. Finally add the 2 totals together. Position in a grid to support movement to column method. 24 + 15  44 + 15 = 69 	After practically using the Dienes blocks and place value counters, children can draw the counters or dienes to help them to solve additions.  Identify which digits are changing.	Record the calculation 24 + 15 = 39 4 + 5 = 9 20 + 10 = 30 30 + 9 = 39 If and when, children are ready, represent this on the column method. 24 + 15 9 30 39

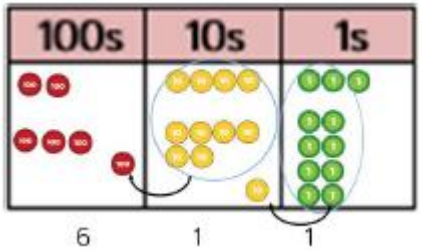
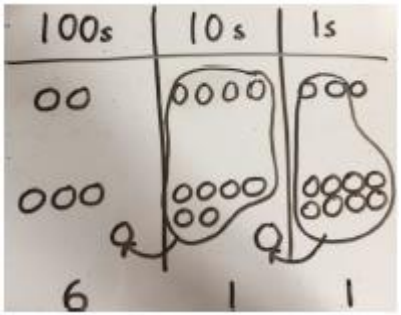
TO + TO Addition with regrouping using dienes. Continue to develop understanding of partitioning and place value. 36 + 25  	Children to represent the dienes in a place value chart.  	Add by partitioning 36 + 25 = 30 6 20 5 Add the ones 6 + 5 = 11 Add the tens 30 + 20 = 50 Add them together 50 + 11 = 61 Augmentation – add to an amount 36 + 25 = Add the 20 to 36 36 + 20 = 56 Add the 5 to 56 56 + 5 = 61 Looking for ways to make 10.  Set it out using the column method – expanded 36 + 25 11 50 61 Formal written method 36 +25 61 1

Band 3

Pupils should be taught to:

- 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
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Concrete	Pictorial	Abstract
TO + TO Addition with regrouping using dienes. Continue to develop understanding of partitioning and place value. 36 + 25  	Children to represent the dienes in a place value chart.  	Add by partitioning 36 + 25 = 30 6 20 5 Add the ones 6 + 5 = 11 Add the tens 30 + 20 = 50 Add them together 50 + 11 = 61 Augmentation – add to an amount 36 + 25 = Add the 20 to 36 36 + 20 = 56 Add the 5 to 56 56 + 5 = 61 Looking for ways to make 10. 

		Set it out using the column method – expanded 36 + 25 11 50 61 Formal written method 36 +25 61 1
Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred. 243 + 368 =  Children must physically exchange 10 ones for 1 ten to get a good understanding, before moving onto formal written method. This can also be done with dienes to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100. As children move on to decimals, money and decimal place value counters can be used to support learning.	Children to represent the counters in a place value chart, circling when they make an exchange.  	243 +368 611 1 1

Band 4

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
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Concrete	Pictorial	Abstract
See earlier bands for strategies to use.		

Band 5

Pupils should be taught to:

- 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
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

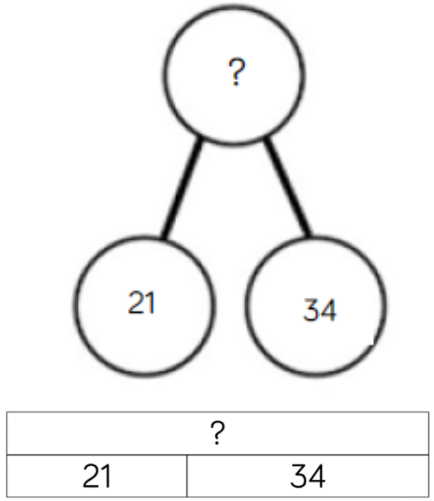
Concrete	Pictorial	Abstract
See earlier bands for strategies to use.		

Band 6

- 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
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Concrete	Pictorial	Abstract
See earlier bands for strategies to use.		

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



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

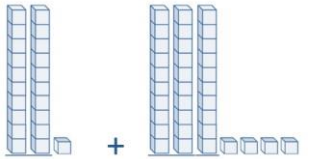
21 + 34 = 55. Prove it

21
+34
____

21 + 34 =

= 21 + 34

Calculate the sum of twenty-one and thirty-four.



Missing digit problems: