Doxey Primary School

Calculation policy for addition and subtraction

This calculation policy has been written alongside the long term plan for Maths in school, which is taken from the White Rose Maths Schemes of Learning.

This policy is written to enable children to become fluent mathematicians; being able to work flexibly, accurately and efficiently. It is expected that children move forwards/backwards between concrete, pictorial and abstract; often using different representations alongside each other in order to embed their conceptual understanding.

More details around the teaching and learning of each operation have been downloaded from the NCETM website. These documents are the NCETM Spines; 1 – addition and subtraction, 2 – multiplication and division and 3 – fractions, which can be found on Sharepoint.

Calculation policy for addition and subtraction

Note: to calculate – not to count.

Year guidance for addition	**EYFS/Year 1** Combining two parts to make a whole; part whole model Starting at the bigger number and counting on as one group (ie one group of 3 rather than 3 ones) Regrouping to make 10 using ten frame	**Year 2** Adding three single digits, regrouping to make 10 Starting at the bigger number and counting on (partitioning to add in groups rather than ones)	**Year 3** Column method regrouping Use place value counters (up to 3 digits)	**Year 4** Column method regrouping Use place value counters (up to 4 digits)	**Year 5** Column method regrouping Abstract Use place value counters for adding decimals	**Year 6** Column method regrouping Abstract methods Use place value counters for adding decimals
Year guidance for subtraction	Taking away ones Counting backwards Find the difference Part whole model	Counting back as one group. Find the difference Part whole model Use of base 10	Column method with regrouping (Up to 3 digits using place value counters)	Column method with regrouping Use place value counters (up to 4 digits)	Column method with regrouping Abstract for whole numbers Start with place value counters for decimals – with the same amount of decimal places	Column method with regrouping Abstract for whole numbers Start with place value counters for decimals – with different amount of decimal places

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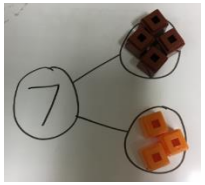
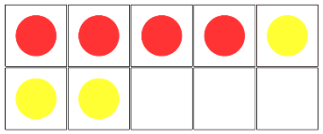
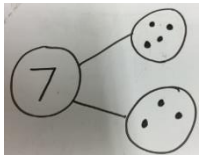
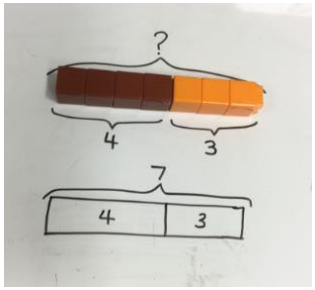
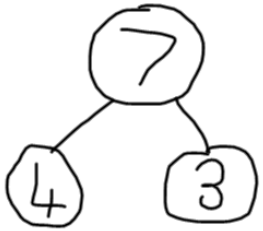
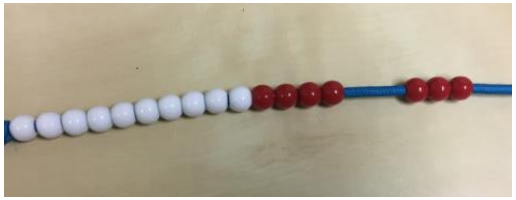
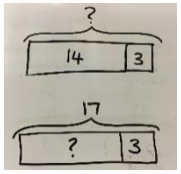
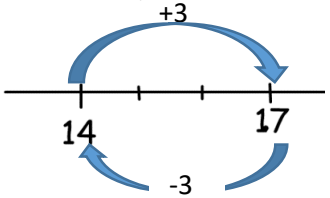
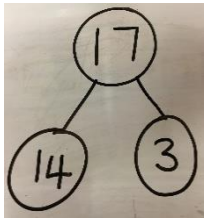
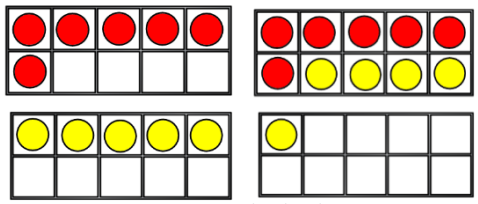
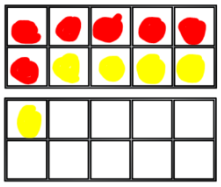
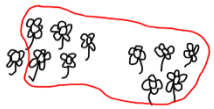
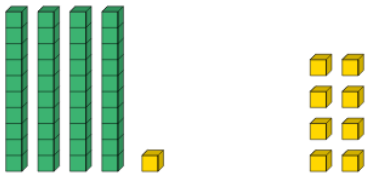
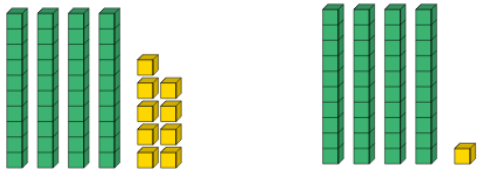
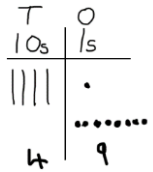
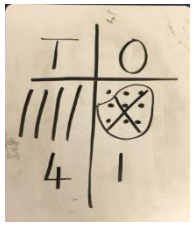
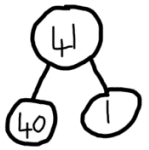
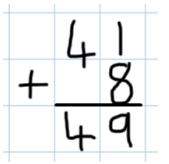
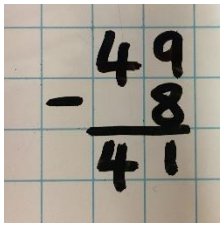
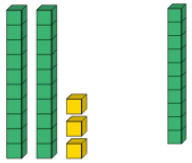
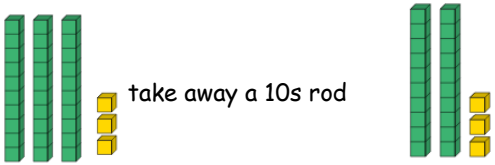
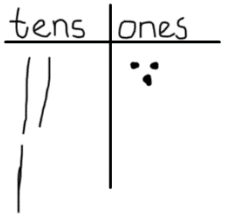
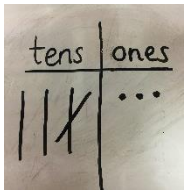
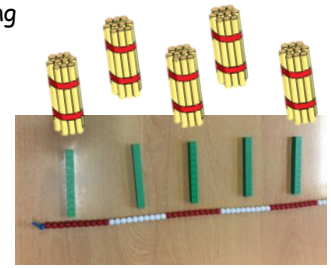
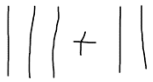
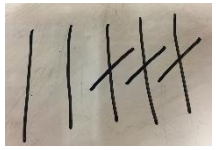
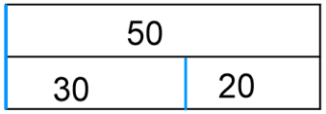
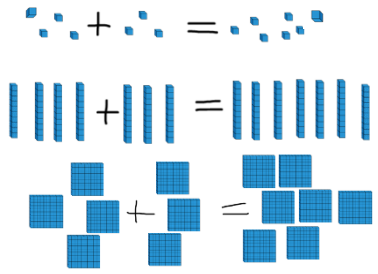
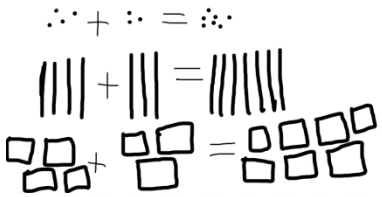
Objective and strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole (use other resources too e.g. conkers, pine cones) Physically taking away and removing objects from a whole. **Finding 1 more / 1 less than a given number**	4 + 3 = 7 7 – 3 = 4    Use part whole method Use cubes to add two numbers together as a group, or subtract a part from the whole. Can also be done in a bar.  	4 + 3 = 7 7 – 3 = 4  Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.   Use pictures to add two numbers as a group or in a bar. Subtract by crossing out pictures or using the bar to find the other part	4 + 3 = 7 3 + 4 = 7 7 – 4 = 3 7 – 3 = 4 Four is a part, three is a part and the whole is seven. Use the part whole diagram to move into the abstract. 
Counting on/back using number lines, cubes or bead strings. Moving away from counting in 1s by using known facts 14 + 3 = 17 I know 4 + 3 = 7 add 10 = 17	14 + 3= 17 17 – 3=14 Start with the larger number on the bead string and then count on by adding one group of 3 to find the answer (calculation not count)  Start with the largest numbers on the bead string and then count back by taking away a group of 3 to find the answer.	14 +3=17 17 – 3 = 14 A bar model which encourages the children to count on, rather than count all  To subtract children start with the whole number and subtract the group of 3. Starting at the larger number on the number line and count on/back in one jump to find the answer. 	14 +3=17 17 – 3 = 14 Use known number facts. What is 3 more than 4? So what is 3 more than 14? What is 3 less than 7? So what is 3 less than 17? What is the sum of 3 and 4? So what is the sum of 3 and 14? What is the difference between 7 and 3? So what is the difference between 17 and 3? 4 + 3 = 7 so 14 + 3 = 17 7 – 3 = 4 so 17 – 3 = 14 

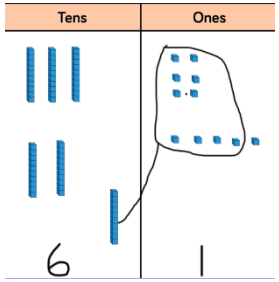
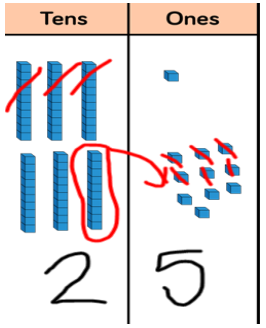
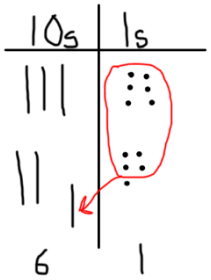
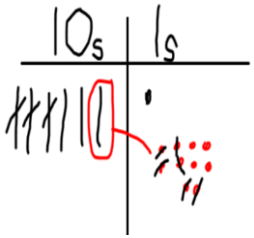
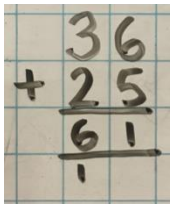
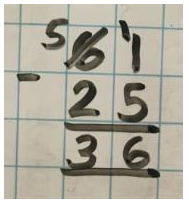
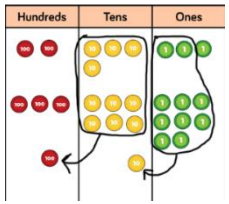
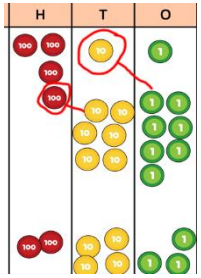
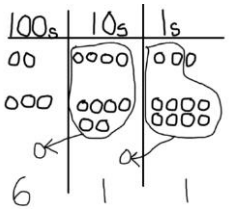
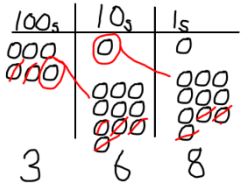
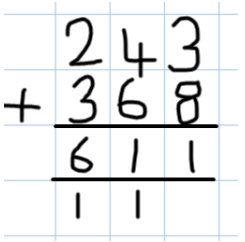
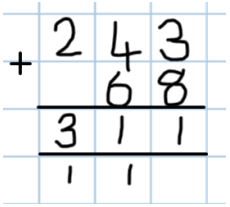
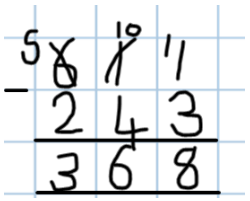
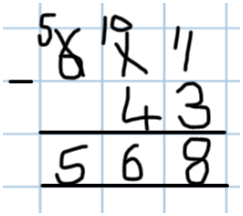
Calculation policy for addition and subtraction

Regrouping to make 10; using ten frames and counters/cubes - essential for column addition later	6 + 5 = 11 11 – 5 = 6  For addition; start with the larger number and use the smaller number to make 10 For subtraction; start with the larger number and remove a group of five and rearrange/regroup the counters on the tens frame.	6 + 5 = 11 11 – 5 = 6 Children to use the ten frames and counter/cubes  For subtraction; cross out a group of 5. What is left on the ten frame? Use pictures to regroup or partition the smaller number using part-part whole model to make 10 	Children to develop an understanding of equality eg 6 + ☐ = 11 6 + 5 = 5 + ☐ 11 – ☐ = 6 11 - ☐ = 5
TO + O using base 10 **TO – O using base 10**	41 + 8 = 49 49 – 8 = 41 Continue to develop understanding of partitioning and place value 41 +8 - without bridging the tens to begin with.  Using diennes, physically remove a group of 8. 49 – 8 = 41 	41 + 8 = 49 49 – 8 = 41 Children to represent the base 10 eg lines for tens and cot/crosses for ones. Ensure the 10s line is obviously bigger than the ones representation  Pictorial representation of tens and ones then cross out the group to subtract.  At this point, children should be able to be able to group 8 as this can be seen as 1 less than 9, so they should not need to count 8 ones to cross out individually. They can group leaving only 1 on the outside.	**41 + 8 =**  1 + 8 = 9 40 + 9 = 49  **49 – 8 =** 9 – 8 = 1 49 – 8 = 41  Remember to calculate units first with column method.

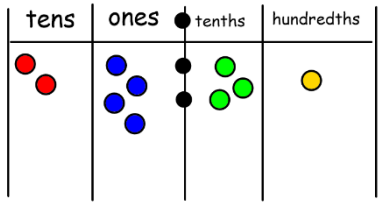
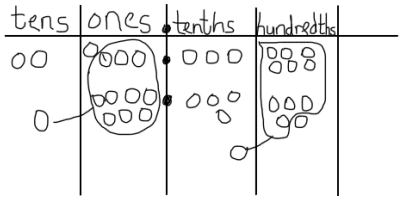
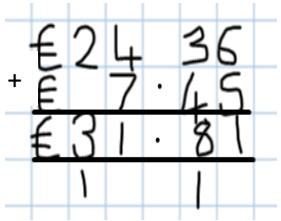
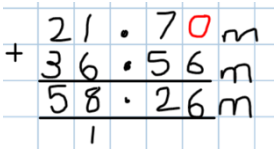
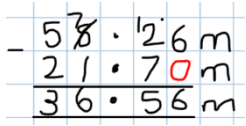
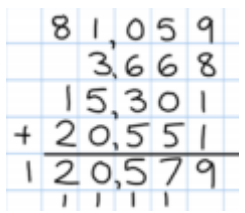
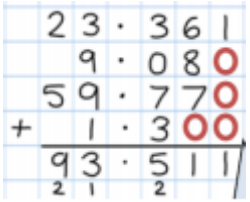
Calculation policy for addition and subtraction

TO + T using base 10 **TO – T using base 10**	23 + 10 = 33 Explore that the ones digit does not change when adding or subtracting 10  33 – 10 = 23  take away a 10s rod	 23 + 10 = 33  33 – 10 = 23	Pattern seeking 23 + 10 = 33 33 + 10 = 43 43 + 10 = 53 53 + ? = 63 63 – 10 =53 53 – 10 = 43 43 – 10 = 33 33 - ? = 23
Adding multiples of 10 Not always starting from a multiple of ten (51 -30 = 21) **Subtracting multiples of 10**	50 = 30 + 20 Model using diennes/or bundles of straws and beadstring  50 – 30 = 20 Notice that the ones digit does not change when adding or subtracting multiples of 10	Use representations for base 10  3 tens + 2 tens = 5 tens 30 + 20 = 50  5 tens – 3 tens = 2 tens 50 – 30 = 20	Explore related facts 20 + 30 = 50 50 = 30 + 20 50 - 30 = 20 50 - 20 = 30 
Using known facts to add and subtract	4 + 3 = 7 40 + 30 = 70 400 + 300 = 700 	Children draw representations of H, T and O 	If I know that 4 + 3 = 7 I also know that 40 + 30 = 70 and I also know that 400 + 300 = 700 If I know that 7 – 3 = 4 I also know that 70 – 30 = 40 and I also know that 700 – 300 = 400

Calculation policy for addition and subtraction

TO + TO/ TO - TO using base 10 - continue to develop understanding of partitioning and place value. **Introducing exchange (not carrying or borrowing)**	36 + 25 = 61 **Exchanging** 10 ones for 1 ten.  61 – 36 = 25 **Exchanging** 1 ten for ten ones so that 6 ones can be subtracted Remember not to count the ten that has been exchanged! 	Children to represent the base 10 in a place value chart 36 + 25 = 61   61 – 36 = 25	Looking for ways to make 10 36 + 25 = 4 1 36 + 20 + 4 + 1 36 + 4 = 40 21 + 40 = 61 Looking for ways to get back to the last multiple of 10 61 – 36 = 1 5 61 – 1 = 60 60 – 30 = 30 30 – 5 =25   Remind children about exchanging.
Use of place value counters to add HTO + TO, HTO + HTO etc **Use of place value counters to subtract 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 = 611  611 – 243 = 368 When there are not enough ones in the 1s column, we **exchange** 1 ten for 10 ones. When there are not enough 10s we **exchange** 1 hundred into 10 tens. 	Children to represent the counters in a place value chart circling when they make and exchange 243 + 368 = 611  611 – 243 = 368 For subtraction crossing out counters. Remember not to count the ten that has been exchanged! 	Ensure that children line up the ones/units to the right.    

Calculation policy for addition and subtraction

Use of place value counters to add/subtract with decimals	 Introduce decimal place value counters	model exchange for addition £24.36 + £ 7.45 and subtraction £ 31.81 – £7.45 	Money is a good way to introduce decimal addition/ subtraction but it always has 2 decimal places so children still line up numbers to the right.   Ensure a diet of opportunities to offer addition/subtraction with a different number of decimal places such as measure to ensure children are calculating by lining their digits up to the decimal point.  
Add/subtract several numbers of increasing complexity and with different numbers of decimal points			Include zeros for place holders always ensuring the numbers are lining up to the decimal point.  

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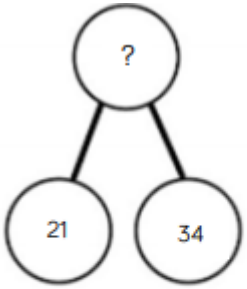
Note: To calculate – not to count.

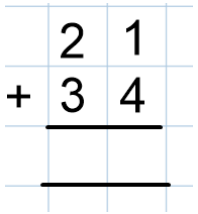
Conceptual variation for addition; different ways to ask children to solve 21 + 34



?	
21	34

Word problems;
In year 3 there are 21 children and in year 4 there are 34 children.
How many children are there altogether?

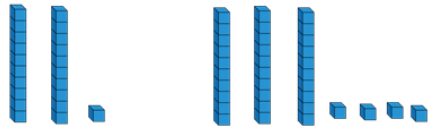
21 + 34 = 55 Prove it!



21 + 34 =

□ = 21 + 34

Calculate the sum of 21 and 34

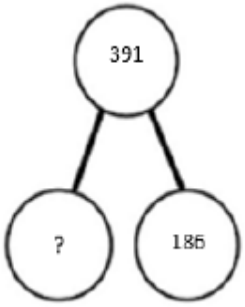


Missing digit problems

10s	1s
	1
?	
?	5

+	2	?
	?	4
	5	5

Conceptual variation for subtraction; different ways to ask children to solve 391-186



391	
186	?

Raj spent £391, Timmy spent £186. How much more did Raj spend?

Calculate the difference between 391 and 186.

□ = 391 – 186

391

-186

What is 186 less than 391?

Missing digit calculations

	3	9	□
-	□	□	6
□		0	5

The above are suggestion for how to ensure fluency, by using a variety of question types, within these operations. Children should be offered a range of question types (not all at once) during their practise.