Reviewed and Adopted by:
Full Governing Body
Policy Adopted - 28th January 2015

CALCULATION POLICY

Introduction

This policy outlines the teaching, organisation and management of the teaching of calculations at Guilsborough CEVA Primary School. The school's policy for calculations is based on the Progress Drives from Big Maths, the New Primary Curriculum 2014 document for the teaching of mathematics from Year 1 to Year 6, and the Early Years Foundation Stage (EYFS) curriculum.

Aims

At Guilsborough, through a consistent and logical progression in learning, we aim to equip our children with the mathematical knowledge and understanding that they will be able to use and apply in their everyday lives. We strive to ensure that all children have fluency in basic number knowledge and are able to apply reason and logic to problems.

Age stage expectations

The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, however it is vital that pupils are taught according to the stage that they are currently working at, being moved onto the next level as soon as they are ready, or working at a lower stage until they are secure enough to move on.

Teaching Calculations

The children in Early Years Foundation Stage (EYFS) will work towards their Early Learning Goals in line with EYFS curriculum. Learning will be organised to promote social skills and the development of mathematical language and understanding. Mathematical understanding should be developed through stories, songs, games and imaginative play. This is supported by the use of Big Maths.

In Key Stage 1 and Key Stage 2 our prime focus is to develop high levels of numerical understanding for all of our children. This is achieved by using the Big Maths approach to teaching number. Big Maths lessons are taught using the CLIC approach. These lessons are divided into 4 sections:

- **C**ounting
- **L**earn Its
- **I**t's Nothing New
- **C**alculations

In addition, core mental arithmetic skills (Learn Its) are assessed weekly using the Big Maths Beat That tests.

We aim to ensure that children's ability to use and apply mathematics is developed by regular use of the plenary session. Furthermore we recognise the importance of creating opportunities to reinforce mathematical learning in other subject areas to put the learning in context. When solving problems we use the RUCSAC approach.

We understand the importance of number work in children's mathematical development and recognise that the majority of time in mathematics should be spent learning in this area. In order to ensure that there are no gaps in number learning, these areas are taught daily in the CLIC part of our lessons so that knowledge, skills and understanding are developed over time.

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons.

Progression and Continuity

In order to ensure that there is continuity and progression in the teaching and learning of calculation skills, the school has agreed to follow the progress drives from the Big Maths strategy. (See Progression YR-6)

Reception Year Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
Stage 4- I add the right amount and can count how many altogether		Stage 4- I take away the right amount and count how many are left		Stage 4- I can find the total amount of blocks		Stage 4- I can halve an even number of objects	
Stage 3- I add the right amount		Stage 3 - I can take away the right amount		Stage 3- I can set out groups of blocks when I play		Stage 3- I can share an even number of objects between 2 people	
Stage 2 I know to find the total		Stage 2 I know to take some away then count how many are left		Stage 2- I can find the total amount of toys		Stage 2- I can count how many each person was given	
Stage 1 know when to add some more.		Stage 1 I know when to take some away		Stage 1- I can set out groups of toys when I play		Stage 1- I can give out objects fairly	

Year 1 Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
Step 12- I can add a 1d number to a number to 20		Step 12- I can take a 1d number from a number to 20					
Step 11- I can add 2 or 3 to a number up to 20		Step 11- I can take 2 or 3 from a number to 20					
Step 10- I can add 1 to a number up to 20		Step 10 - I can take 1 from a number to 20					
Step 9- I can solve addition on a number line		Step 9 - I can solve subtraction on a number line					
Step 8- I can solve a number sentence		Step 8 – I can solve a subtraction number sentence					
Step 7- I can arrange a number sequence		Step 7 - I can arrange a subtraction number sentence					
Step 6- I can read a number sentence		Step 6 – I can read a subtraction number sentence		Step 4- I can find the total amount of blocks		Step 4- I can halve an even number of objects	
Step 5- I can add numbers of objects to 10		Step 5- I can take away numbers of objects to 10		Step 3- I can set out groups of blocks when I play		Step 3- I can share an even number of objects between 2 people	
Step 4- I add the right amount and can count how many		Step 4- I take away the right amount and count how many		Step 2- I can find the total amount of toys		Step 2- I can count how many each person was given	
Step 3- I add the right amount		Step 3 - I can take away the right amount		Step 1- I can set out groups of toys when I play		Step 1- I can give out objects fairly	

Year 2 Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
		Step 27- I can solve any 2d-2d					
		Step 26- I can find the 2 gaps in a 2d-2d question					
Step 25- I can solve any 2d+2d		Step 25- I can take a multiple of 10 from any 2d number					
Step 24- I can add a 2d number to a 2d number		Step 24- I know the total gap across a multiple of 10					
Step 23- I can add any 2d tens number to a 2d number		Step 23- I know the 1 digit gap from a multiple of 10				Step 15- I can solve division, using objects (with remainders)	
Step 22- I can add a 2d tens number to a 2d number		Step 22- I know the gap to the next multiple of 10				Step 14- I can solve a division number sentence	
Step 21- I can add any 2d tens number to another one		Step 21- I can count to the next multiple of 10				Step 13- I can arrange a division number sentence	
Step 20- I can solve any 2d+1d		Step 20- I can spot the next multiple of 10				Step 12- I can find how many altogether by counting in 2s, 5s or 10s	
Step 19- I can solve any 1d+1d in my head		Step 19- I can solve any 3d-1d				Step 11- I can find how many altogether by counting through each group	
Step 18- I can add a 2d tens number to another one		Step 18- I can solve any 2d-1d				Step 10 - I can make groups of 2,5 or 10	
Stage 17- I can solve 2d+1d		Step 17- I can solve 2d-1d		Step 9- I can solve 1dx1d		Step 9 -I can share equally to solve division problems	
Step 16- I can add a 1d number to a 2d tens number		Step 16 - I can take a 1d number from a multiple of 10		Step 8- I can solve repeated addition		Step 8 -I can share 8 ,12,16 or 20 objects into 4	
Step 15- I can add 10 to any 2d number		Step 15- I can take a multiple of 10 from a multiple of 10		Step 7 - I can write out repeated addition		Step 7 -I can share 8,12,16 or 20 objects between 4 people	
Step 14- I can add 10 to a 2d tens number		Step 14- I can take 10 from a 2 digit number		Step 6 - I can find the total amount of dots		Step 6 - I can share 6,9,12 or 15 objects into 3	
Step 13- I can add 1 to a 2d number		Step 13- can take 10 from a multiple of 10		Step 5 - I can draw out groups of dots		Step 5 -I can share 6,9,12 or 15 objects between 3 people	

Year 3 Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
Step 31- I can solve any 3d+3d as money		Step 33- I can solve 3d-3d as money					
Step 30- I can solve 3d+3d as money		Step 32- I can solve 3d-3d				Step 19- I can combine 2 or more tables facts to solve division (with remainders)	
Step 29- I can solve any 3d+3d		Step 31- I can solve 4d-2d				Step 18- I can combine 2 or more tables facts to solve division	
Step 28- I can solve 3d+3d		Step 30- I can solve any 3d-2d				Step 17- I can use a tables fact to find a division fact (with remainders)	
Step 27- I can solve any 3d+2d		Step 29- I can take 100 from any 3d number		Step 11- I can solve 2d x 1d (x2,3,4,5)		Step 16- I can use a tables fact to find a division fact	
Step 26- I can solve 3d+2d		Step 28 - I can take any 2d number from 100		Step 10- I can do smile multiplication (x2,3,4,5)		Step 15 - I can solve division, using objects (with remainders)	

Year 4 Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
				Step 16 - I can solve 2dx2d			
				Step 15 - I can solve 3dx1d		Step 23 - I can combine 2 or more tables facts to solve division (with remainders)	
				Step 14 - I can solve any 2dx1d		Step 22 - I can combine 2 or more tables facts to solve division	
Step 34 - I can solve 1d.1dp+1d.1dp				Step 13 - I can do any smile multiplication		Step 21 - I can use a tables fact to find a division fact (with remainders)	
Step 33- I can solve any 1dp+1dp				Step 12- I can solve any 1dx1d		Step 20 - I can use a table fact to find a division fact	
Step 32- I can solve 1dp+1dp		Step 33- I can solve 3d-3d as money		Step 11- I can solve 2dx1d (x2,3,3,4,5)		Step 19 - I can combine 2 or more tables facts to solve division (with remainders)	

Year 5 Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
Step 41- I can solve any 2dp+1dp							
Step 40 - I can solve 2dp+1dp						Step 29 - I can use a coin fact to find a division fact (with remainders)	
Step 39 - I can solve additions with several numbers						Step 28- I can find a coin fact to find a division fact	
Step 38 - I can solve additions with larger numbers		Step 37- I can subtract numbers with different decimal places				Step 27- I can combine a smile multiplication fact with a tables fact to solve division (with remainders)	
Step 37- I can solve any additions with 2dp		Step 36 - I can solve any whole number subtraction question				Step 26 - I can combine a smile multiplication fact with a tables fact to solve	
Step 36 - I can solve additions with 2dp		Step 35 - I can subtract numbers with tenths		Step 18 - I can multiply hundredths		Step 25 - I can use a smile multiplication fact to find a division fact	
Step 35 - I can solve any 1d.1dp+1d.1dp		Step 34 - I can subtract numbers with hundredths		Step 17- I can multiply tenths		Step 24 - I can use a smile multiplication fact to find a division fact	

Year 6 Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
						Step 33 – I can combine 2 or more table facts to solve a decimal division fact.	
						Step 32 – I can use table facts to find a decimal division fact.	
						Step 31 - I can combine 2 or more coin facts to solve division (with remainders)	
						Step 30 – I can combine 2 or more coin facts to solve division.	
Step 41- I can solve any 2dp+1dp				Step 19 – I can solve 3d x 2d		Step 29- I can use a coin fact to find a division fact (with remainders)	
Step 40- I can solve 2dp+1dp		Step 37- I can subtract numbers with different decimal places		Step 18- I can multiply hundredths		Step 28- I can find a coin fact to find a division fact	

Column Methods at Guilsborough CEVA Primary

'Column Methods' are the traditional, compact algorithms for solving calculations using pencil and paper. 'Column Methods' is a generic title since for all 4 operations we move from column to column addressing each column one at a time. These traditional methods involve terminology such as 'carrying', 'borrowing', 'doorstep', 'bus-stop' etc.

Why do we teach 'Column Methods'?

The starting point for Big Maths is to teach for understanding. Column Methods, however, are generally low on understanding but they are much more efficient than high-understanding written methods. Column Methods should be taught to complement the high understanding methods of CLIC.
In Big Maths, Column Methods live in a part of 'outer numeracy' called 'multi-methods'. This is where we teach more efficient methods to already numerate children. In Big Maths children master many high-understanding steps before they start to learn Column Methods so that the Column Methods don't mask, or cause, low levels of numeracy.
However, even when children have started learning Column Methods they continue to make progress up the Progress Drives from the calculation part of CLIC. This is crucially important because:
• it is the high-understanding steps that empower children to be properly numerate,
• in some cases the steps in the Calculation part of CLIC provide a direct explanation for what is happening in the column method procedure,
• these steps lead to progression in mental maths, whereas Column Methods do not.

When to teach 'Column Methods'

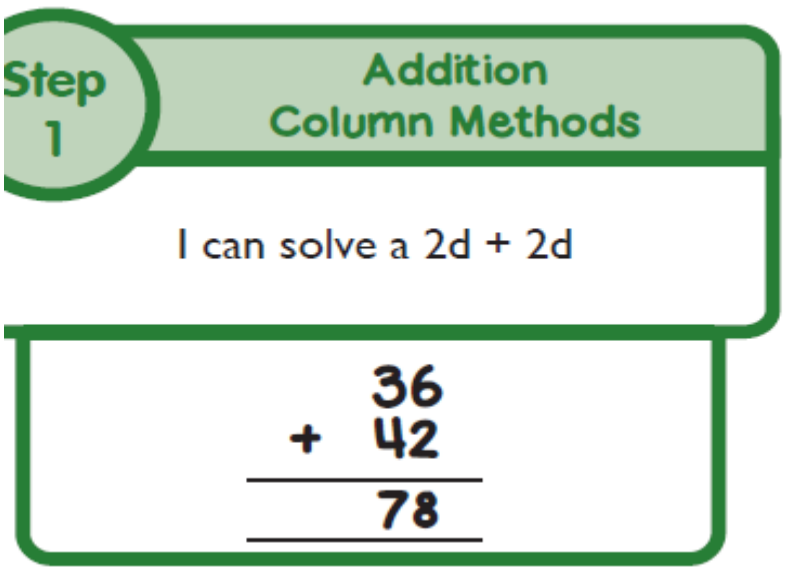
The steps of progression provided here will be taught as an isolated sequence of progression; they only begin after children have secured the high-understanding foundations from CLIC as follows:
• Addition: after Step 24 Year 3
• Subtraction: after Step 27 Year 3
• Multiplication: after Step 11 Year 4
• Division: after Step 18 Year 5
Following on from these steps children start a sequence of progression for written Column Methods. However they also continue with the steps from CLIC in order to make progress with mental methods.

The Column Methods

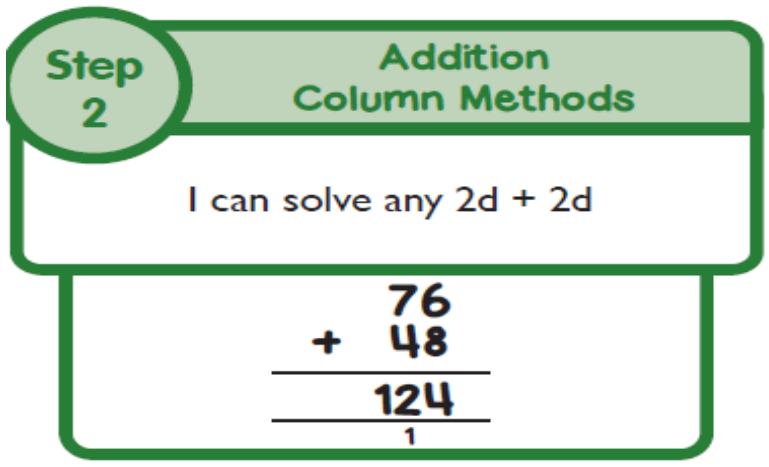
Addition

Year 3

This is the step where children are first introduced to a column method. Children will be taught this step after 'CLIC: Addition Step 24' which provides the understanding to underpin the column method. Inputting the foundations of understanding at this point is crucial, since all future column addition steps can be more quickly understood without the need to unpick them in great detail. Children are not 'crossing 10' with the total of each column, hence they are solving a 2d + 2d question but not any 2d + 2d question.



Children will be taught this step after 'CLIC: Addition Step 25' which will provide the understanding to underpin the 'doing' of this step - particularly visualizing the 'carrying of the 10'. Therefore children will only be entering this step once they are competent with all 1d + 1d 'Learn Its', so that finding the total of each column is a non-issue. The new learning for the child here is to 'carry the 10' and remembering to add it to the total of the tens column.



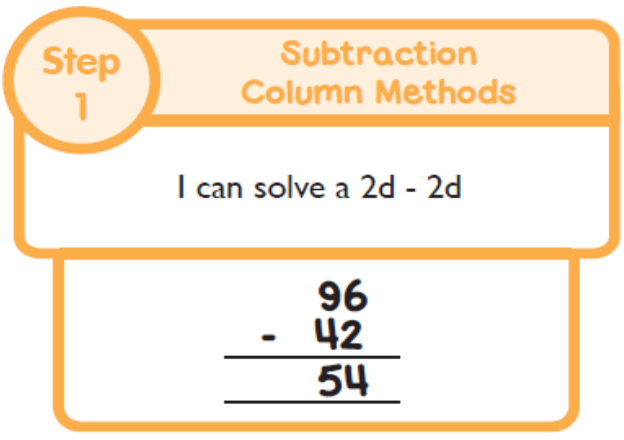
Every child should have completely mastered this skill before moving on as it will be used again and again in future steps.

Children will continue to work through the progress drives for calculations as appropriate (see Written Calculation Progress Drives).

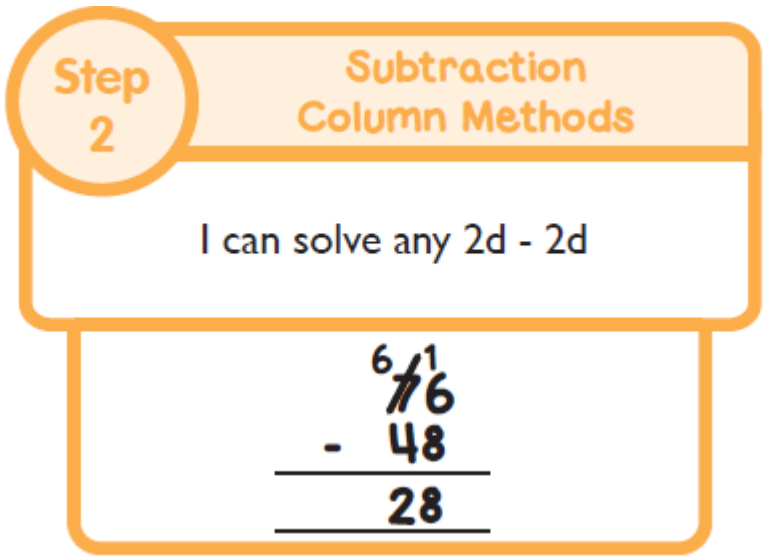
Subtraction

Y3

This is the step where children are first introduced to a column method for subtraction. Children should be taught this step after 'CLIC: Subtraction Step 27' which ensures children can already understand subtracting a 2d number from a 2d number. However, there is not a direct link between the high-understanding method and the column method for subtraction as there was for addition. This holds true as we progress up the column method Progress Drive for subtraction. Children are not needing to 'borrow' from the tens column, so here they are learning to solve a 2d - 2d question but not any 2d - 2d question. Therefore, children will only be entering this step once they are competent with all 1d - 1d 'Learn Its', so that finding the difference between the top number and the bottom number of each column is a not an issue.



Here the pupil is faced with questions where they cannot simply 'go down the columns' as they come across situations where the units' digit in the bottom number is larger than the units' digit in the top number. The new learning for the child here is to 'borrow 10' from the next digit of the top number, remembering to cross it out and reduce it by 1 (really 10) and to write it in front of the units digit to create a mini-tens column with a small '1' in it. Every child should have completely mastered this skill at this step before moving on as it will be used again and again in future steps. Therefore children will only be entering this step once they are competent with the ability to subtract 1d numbers from a number to 19 ('CLIC: Subtraction Step 12'), so that finding the difference between the top number (after the borrowing) and the bottom number of each column is a not an issue.



Children will continue to work through the progress drives for calculations as appropriate (see Written Calculation Progress Drives).

Multiplication.

Y4

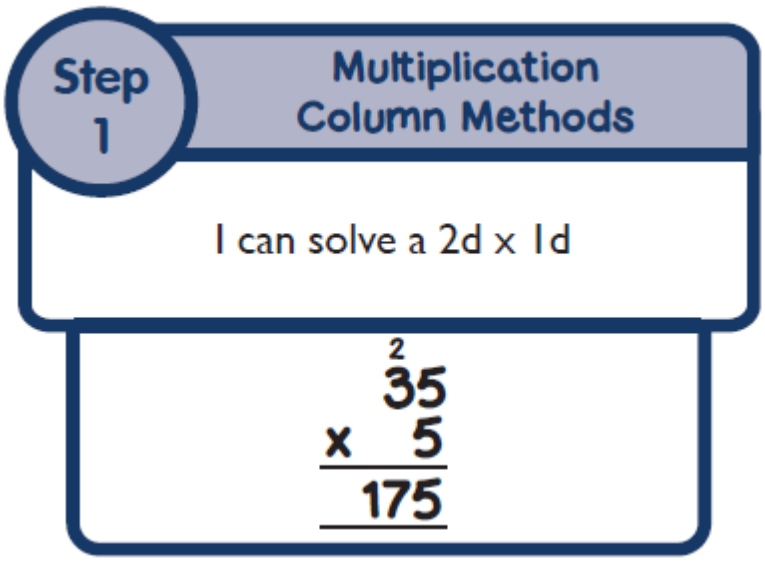
Children should be taught this step after 'CLIC: Multiplication Step 11' which provides the understanding to underpin the column method. Inputting the foundations of understanding at this point is crucial, since all future column multiplication steps can be more quickly understood without the need to unpick them in great detail. Children are not solving any 2d x 1d . Here, the focus is just on multiplying by 2, 3, 4 or 5. If

children have instant recall of these tables from the 'Learn Its' part of CLIC then we can isolate the new learning (i.e. the column method procedure). Hence, it can be any 2d number but the 1d number would be either 2, 3, 4 or 5.

Obviously, the first new issue is to present the question as a formal column method, and for children to recognise it as a familiar 1d x 2d question. Then, the next new learning point is that the 2d product of the 1d times 1d multiplication is split so that the units digit from the answer goes into the units digit space for the overall answer, but the tens digit is carried into the tens column ready to add to the answer from the next stage.

Step 1 also assumes children have mastered Smile Multiplication (understanding and doing) from the It's Nothing New part of CLIC. This is crucial since it explains why, when we move to multiply the tens digit from the 2d number by the 1d number, we can think of it as a 1d x 1d question (the 'tables bit' from Smile Multiplication). We now have an amount of tens. If we remember to add on the tens from the initial 1d x 1d stage then we have the overall amount of tens, and because we have already written in the units digit for the overall answer then we are automatically recording the amount of tens in the tens column (and possibly extending into the hundreds column).

Therefore, we can easily see the understanding behind the efficiency of this method. As we progress up the Multiplication Column Method Progress Drive we can unpick the understanding as much as is useful and relevant, and as much as the children are able, but it is clearly a good investment to take the time to link the high understanding of the 1d x 2d step to the column method procedure for 2d x 1d at this introductory step.



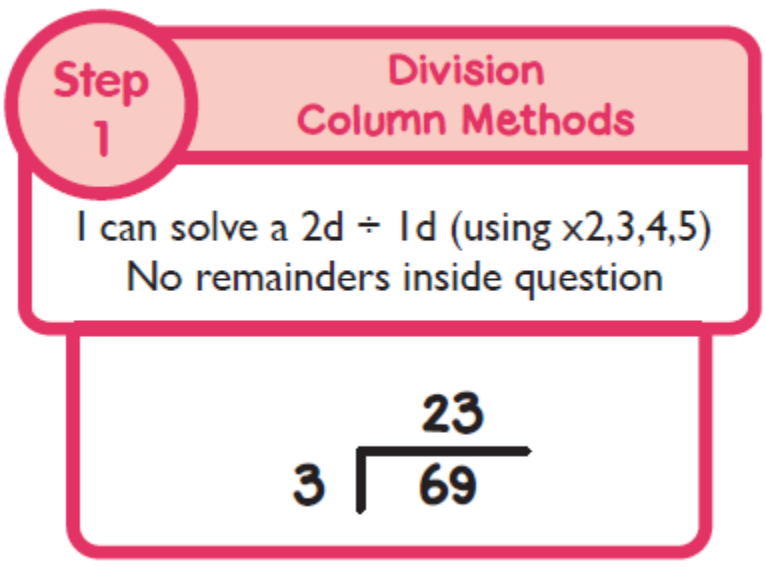
Children will continue to work through the progress drives for calculations as appropriate (see Written Calculation Progress Drives).

Division

Y5

This uses the layout sometimes known as the 'bus-stop'. Children should be taught this step after 'CLIC: Division Step 18' which provides the understanding to underpin this column method. As with that step, the assumption here is that children know the relevant tables that they need with no hesitation (in this case x2,3,4,5).

Here, to begin with there are no remainders in the answer, although it is useful that children have already come across remainders in their high understanding division steps since this adds ability and confidence to make this step easy. Hence, the new learning is just the skill of going along the columns and developing the verbal rhythm that goes with it, "Fours into 8 go 2, fours into 4 go 1."



Not only are there no remainders in the answer at this first step, there are also no remainders inside the question, i.e. as children move along the columns they find that the number divides perfectly.
Children will continue to work through the progress drives for calculations as appropriate, see Written Calculation Progress Drives below:

Year 3 Written Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
Step 5 – I can solve a 3d + 3d		Step 5 - I can solve any 3d – 3d					
Step 4 – I can solve any 3d + 2d		Step 4 - I can solve any 3d – 2d					
Step 3 – I can solve a 3d + 2d		Step 3 - I can solve 3d – 2d					
Step 2 – I can solve any 2d + 2d.		Step 2 – I can solve any 2d – 2d					
Step 1 – I can solve a 2d + 2d		Step 1 – I can solve a 2d – 2d					

Year 4 Written Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
Step 9 – I can solve Column addition for several numbers.							
Step 8 – I can solve any 4d + 4d							
Step 7 – I can solve any 4d + 2d or 3d		Step 7 - I can solve any 4d – 4d		Step 3 – I can solve any 3d x 1d			
Step 6 - I can solve any 3d + 3d		Step 6 – I can solve any 4d – 2d or 3d		Step 2 – I can solve any 2d x 2d			
Step 5 – I can solve a 3d + 3d		Step 5 - I can solve any 3d – 3d		Step 1 – I can solve a 2d x 2d.			

Year 5 Written Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
						Step 6 – I can solve 2d ÷ 1d (and 3d ÷ 1d) With remainders.	
				Step 7 – I can solve any 4d x 2d		Step 5 – I can solve 4d ÷ 1d (using any table) No remainders in answer	
Step 12 – I can add numbers with 2dp.		Step 10 – I can subtract numbers with 2 dp		Step 6 - I can solve any 4d x 1d		Step 4 – I can solve 3d ÷ 1d (using any table) No remainders in answer	
Step 11 – I can add numbers with 1dp		Step 9 – I can subtract numbers with 1dp		Step 5 – I can solve any 3d x 2d		Step 3 – I can solve 2d ÷ 1d (using any table) No remainders in answer.	
Step 10 - I can solve any 5d + 5d.		Step 8 – I can solve any 5d – 5d		Step 4 – I can solve any 2d x 2d		Step 2 – I can solve 2d ÷ 1d (using x 2,3,4,5,) No remainders in answer.	
Step 9 – I can solve Column addition for several numbers.		Step 7 - I can solve any 4d – 4d		Step 3 – I can solve any 3d x 1d		Step 1 – I can solve 2d ÷ 1d (using x 2,3,4,5,) No remainders inside question.	

Year 6 Written Calculations Progress Drives

Addition		Subtraction		Multiplication		Division	
				Step 11 - I can solve any 1d.2dp x 2d		Step 10 – I can solve division with decimal places in the answer.	
				Step 10 – I can solve any 1d.2dp x 2d		Step 9 – I can solve 4d ÷ 2d And show remainder as a fraction.	
Step 14 - I can add numbers with mixed amounts of decimal places.		Step 12 – I can subtract numbers with mixed amounts of dp.		Step 9 – I can solve 1d.2dp x 1d		Step 8 – I can solve any 3d ÷ 2d	
Step 13 – I can add numbers with up to 3dp.		Step 11 – I can subtract numbers with 3dp		Step 8 – I can solve any 1d.1dp x 1d		Step 7 – I can solve 4d ÷ 1d And interpret the context of remainder.	
Step 12 – I can add numbers with 2dp.		Step 10 – I can subtract numbers with 2dp		Step 7 – I can solve any 4d x 2d		Step 6 – I can solve 2d ÷ 1d (and 3d ÷ 1d) With remainders.	

Policy, Review and Monitoring

The class teachers, the Mathematics Coordinator and the Headteacher will monitor the approaches detailed in this policy.

Policy due for review	June 2017
Signed on behalf of the Governors	
Date ratified	28th January 2015