St Hugh's

Calculation Policy

May 2014

Purpose and Aims

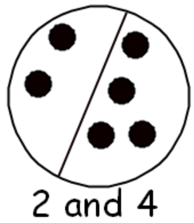
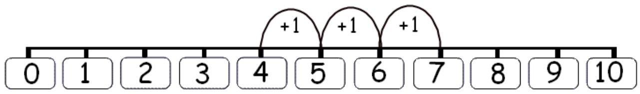
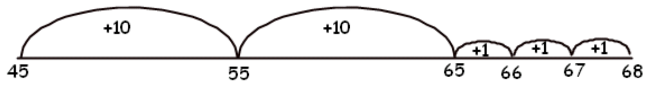
The key aim of this policy is to develop calculation across the school, basing all learning on understanding, never on processes. Pupils are supported to record what they understand. It has been written to ensure consistency and progression throughout the school. It is not intended as a straightjacket, nor is it a scheme of work. It recognises that pupils will develop their mathematical skills at different rates and have their own individual learning styles. They will develop calculation skills through a combination of practical, oral and mental activities. Although the focus of this policy is on pencil and paper procedures, it is important to recognise that in every written method there is an element of mental processing. Written calculation strategies will therefore be taught alongside mental calculation strategies and should be seen as complementary to and not as separate from them.

Informal written recording will take place regularly and is an important part of learning and understanding. More formal written methods follow only when the student is able to use a wide range of mental calculation strategies. The emphasis of our teaching will always be to facilitate understanding and not simply to arrive at a correct answer. It should also be noted that the intention is not for the pupil to reach the last step as quickly as possible, but to progress through the steps at their own pace, focusing on understanding and becoming fully comfortable with the method.

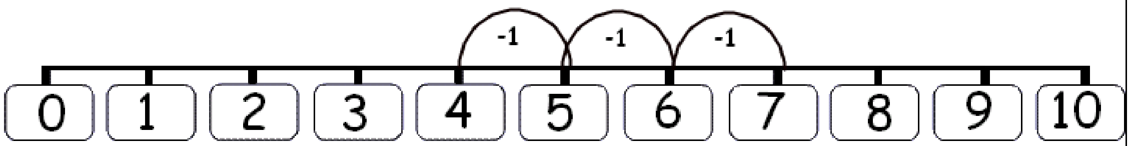
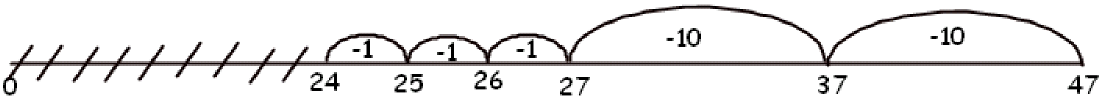
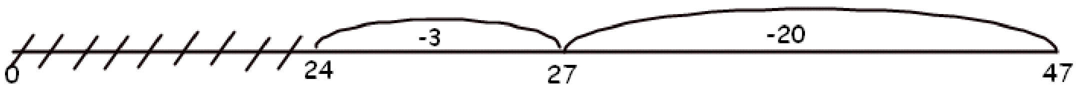
Our aim is for pupils to be able to select an efficient method of their choice (whether this be mental, written or using a calculator) that is appropriate for a given task. They will do this by always asking themselves:

- ‘Can I do this in my head?’
- ‘Can I do this in my head using drawings or jottings?’
- ‘Do I need to use a pencil and paper procedure?’
- ‘Do I need a calculator?’

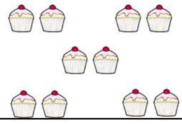
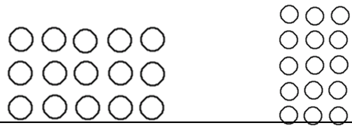
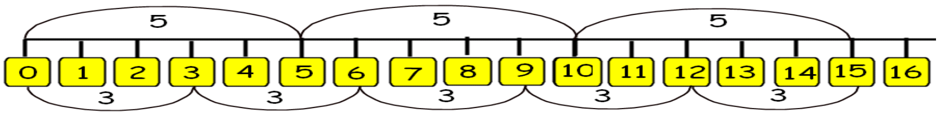
The policy reflects the views of all the staff of the school. It has been drawn up following consultation with staff and has full agreement of the Governing Body and staff. All staff are fully aware of their role in its implementation. Staff have access to the Policy via the *Staff Room,* and on the school’s server via the Teacher’s Drive. Parents are also able to access a copy of the policy upon request.

Step	Method	Example
Step 1	Using pictures and counting totals.	2 + 4 = 6 
Step 2	Using number lines and counting on in units.	4 + 3 = 7 
Step 3	Using number lines and making jumps of tens and units (progressing to unmarked number lines).	45 + 23 = 68 
Step 4	Using partitioning to make jumps up the number line.	45 + 23 = 68 
Step 5	Using partitioning without the aid of a number line.	45 + 23 5+3 = 8 40+20 = 60 60 + 8 = 68
Step 6	Using a vertical method of expanded notation.	45 + 23 45 +23 8 60 68
Step 7	Using a traditional vertical method involving 'carrying' (progressing on to numbers including decimals).	123 +48 123 + 48 171 1

Subtraction

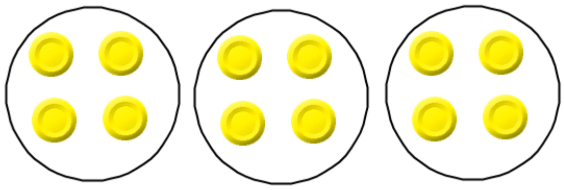
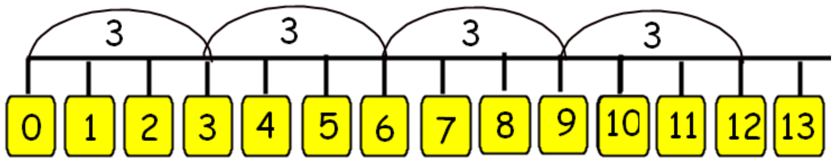
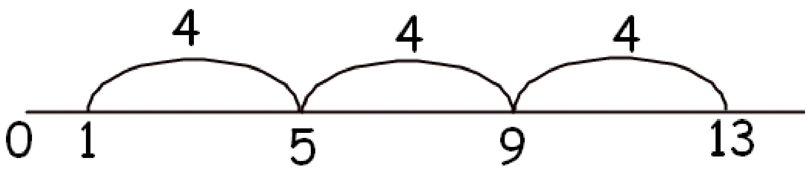
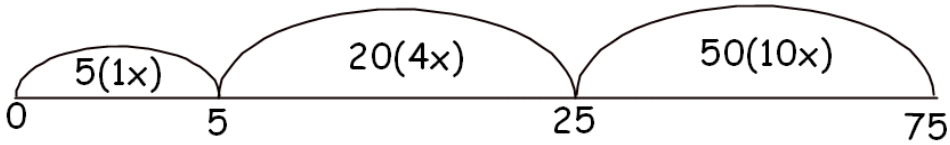
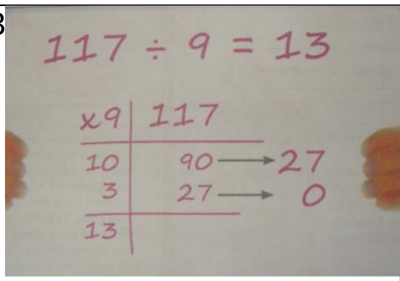
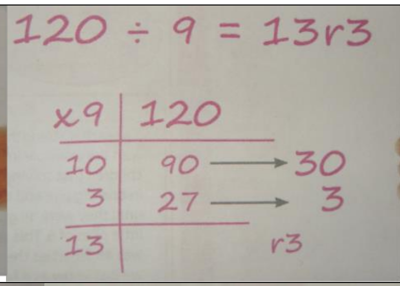
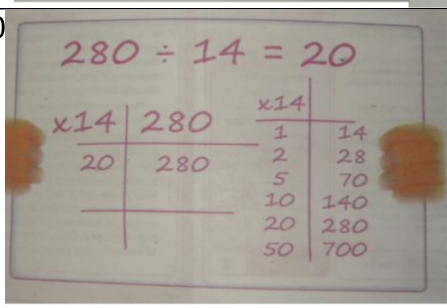
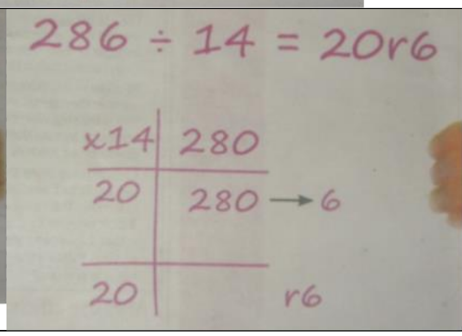
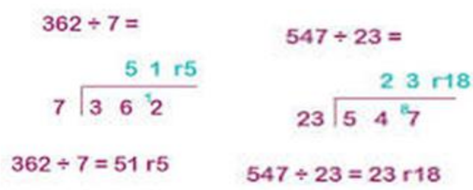
Step	Method	Example
Step 1	Using pictures	8 – 2 = 6 
Step 2	Using number lines and counting back in units	7 – 3 = 4 
Step 3	Using number lines and making jumps back in tens and units (progressing to unmarked number lines)	47 – 23 = 24 
Step 4	Using partitioning to make jumps down the number line	47 – 23 = 24 
Step 5	Using decomposition	89 – 57 8 9 = 8 0 + 9 - 5 7 - 5 0 + 7 3 0 + 2 = 32
Step 6	Using decomposition and exchanging	71 – 46 ^{60}~~70~~ + ^{1}1 - 40 + 6 20 + 5 = 25
Step 7	Using a traditional column method and exchanging	143 – 39 1 ^{3}~~4~~ ^{1}3 - 3 9 1 0 4

Multiplication

Step	Method	Example
Step 1	Using pictures to make groups of objects.	2 x 5 = 10 
Step 2	Using arrays	3 x 5 = 15 
Step 3	As repeated addition on a number line (progressing to an unmarked number line)	3 x 5 = 15 
Step 4	Using the grid method for short and long multiplication (including decimal numbers) **(See appendix 1, smile multiplication, for multiplying multiples of 10.)**	346 x 9 x | 300 | 40 | 6 9 | 2700 | 360 | 54 2700 360 54 + 3114 11 372 x 24 x | 300 | 70 | 2 20 | 6000 | 1400 | 40 4 | 1200 | 280 | 8 6000 1400 1200 280 40 8 + 8928 1
Step 5	Using a vertical method of expanded notation for short and long multiplication	378 x 4 378 x 4 32 (4 x 8) 280 (4 x 70) 1200 (4 x 300) 1512 1 429 x 57 429 x 57 63 (9 x 7) 140 (7 x 20) 2800 (7 x 400) 450 (50 x 9) 1000 (50 x 20) 20000 (50 x 400) 24453 11
Step 6	Using a traditional vertical method for short and long multiplication	378 x 4 378 x 4 1512 33 429 x 57 429 x 57 3003 26 21450 14 24453
Step 7	Adjusting place value to multiply decimal numbers	429 x 5.7 – multiply by 10 – 429 x 57 429 x 57 3003 26 21450 14 24453 24453 – divided by 10 = 2445.3

Written multiplication is supported by a growing confidence of applying 'learn it' facts-a retention of times tables.
Developing this in conjunction with the steps presented in the Mental calculation policy will provide support to written methods-allow for the use of such supports, such as number squares and ask 'yourself'-what is the objective of the lesson as to what support is to be provided. If students are learning the use of the grid method, then a number square or fact families can support their developing proficiency.

Division (From step 2, begin to use 'Where's Mully?' to enhance knowledge of multiples-see appendix 2)

Step	Method	Example
Step 1	Using pictures to group objects.	12 ÷ 3 = 4 
Step 2	As repeated subtraction on a number line (progressing to an unmarked number line).	12 ÷ 3 = 4 
Step 3	As repeated subtraction on a number line – involving remainders.	13 ÷ 4 = 3r1 
Step 4	As repeated subtraction of multiples (or chunks) of the divisor.	75 ÷ 5 = 15 
Step 5	Chunking method for short division (dividing by a unit). **(See appendix 3 for using coin facts to support chunking)**	117 ÷ 9= 13  
Step 6	Chunking method for diving by 2 digit numbers **(See appendix 3 for using coin facts to support chunking)**	280÷14=20  
Step 7	Compact 'bus stop' method. (Attention to detail needs to be professionally applied, as an understanding of the maths by the student needs to be assured)	 362÷7 = 5r5
Step 8	Division involving decimals.	Dividing by decimals by recognising them in terms of proportion. 36 ÷ 1.2 is the same as 360 ÷ 12 = 30 ('Use what they know')

Review

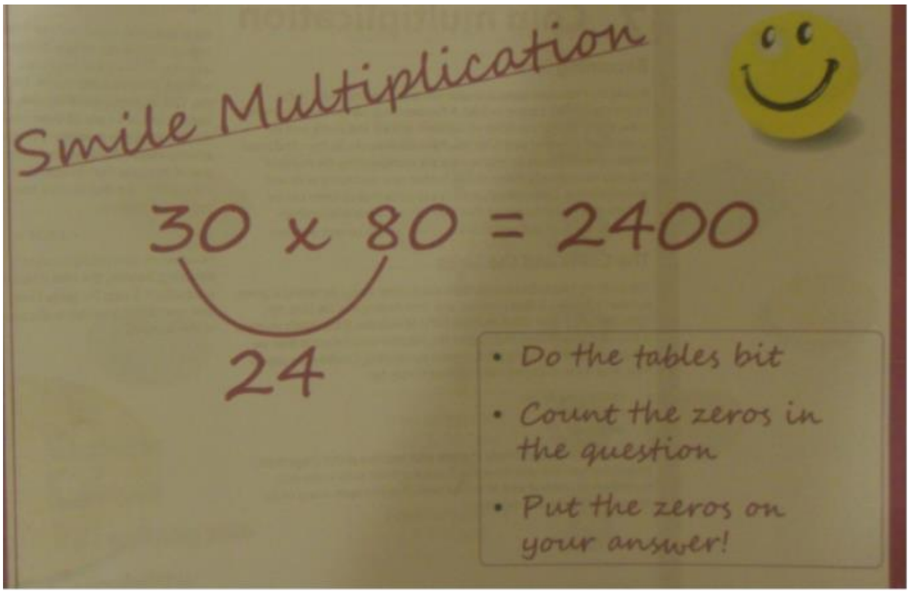
This policy is monitored by the Maths Subject Leader and the Senior Leadership Team through:

- Regular scrutiny of pupil's books;
- Regular monitoring of teaching plans;
- Lesson observations to monitor the quality of teaching and implementation of teaching plans;
- Discussion and feedback from staff;
- Pupil interviews.

This policy is reviewed by staff and governors at least once every two years and whenever Government policy changes. The next review is due by May 2015. Parents are most welcome to request copies of this document and comments are invited from anyone involved in the life of the school.

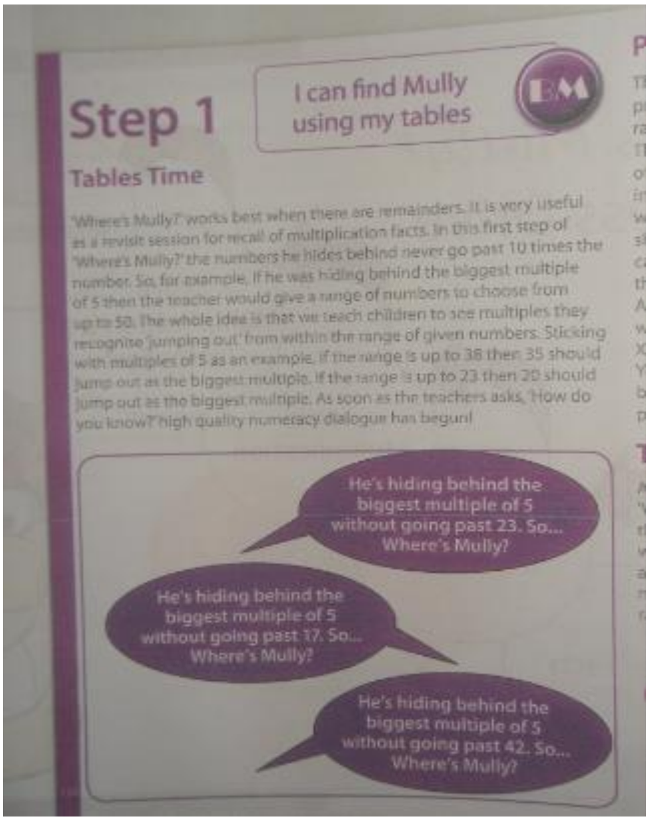
.

Appendix 1



Smile Multiplication
30 x 80 = 2400
24
• Do the tables bit
• Count the zeros in the question
• Put the zeros on your answer!

Appendix 2



Step 1

I can find Mully using my tables

Tables Time

'Where's Mully?' works best when there are remainders. It is very useful as a revisit session for recall of multiplication facts. In this first step of 'Where's Mully?' the numbers he hides behind never go past 10 times the number. So, for example, if he was hiding behind the biggest multiple of 5 then the teacher would give a range of numbers to choose from up to 50. The whole idea is that we teach children to see multiples they recognise 'jumping out' from within the range of given numbers. Sticking with multiples of 5 as an example, if the range is up to 38 then 35 should jump out as the biggest multiple. If the range is up to 23 then 20 should jump out as the biggest multiple. As soon as the teachers asks, 'How do you know?' high quality numeracy dialogue has begun!

He's hiding behind the biggest multiple of 5 without going past 23. So... Where's Mully?

He's hiding behind the biggest multiple of 5 without going past 17. So... Where's Mully?

He's hiding behind the biggest multiple of 5 without going past 42. So... Where's Mully?

Appendix 3

Coin facts (works just as well for 1 digit numbers)