Bishop Ridley C of E Primary School

Calculation Policy

At Bishop Ridley Primary School we recognise the importance of a thorough and secure understanding of calculation both mentally and using written methods. This policy sets out the key written methods for calculation to ensure consistency and progression throughout the school.

We recognise that the methods explained and demonstrated in this policy form a core set of written methods and that class teachers are encouraged to use their professional judgement when teaching and may use other methods to improve children's confidence or develop their understanding of a certain method.

The main focus of this policy is written methods although we recognise that the ability to calculate mentally lies at the very heart of numeracy. Mental calculation should not be at the exclusion of written recording and should be seen as complementary to it. In every written method there is an element of mental processing.

Although some methods are specified at different year groups this is a guide for class teachers as to what most of the children should be able to do by the end of each year. Children should be encouraged to build upon and use methods previously learnt. Class teachers will also use their professional judgement when moving children onto the next stage or method and will also need to recognise that some children may not yet have the depth of understanding to move onto more complex methods while others will be ready to move onto the next stage before the majority of their peers. More able children in younger age groups should be taught the more advanced stages of calculation as part of a differentiated programme of teaching. Regardless of understanding we expect most pupils to be using the agreed formal written methods by the ages laid down in this policy.

Our long term aim at Bishop Ridley is for children to become independent and confident mathematicians and they should be able to select an efficient method of their choice that is appropriate for a given task. They also need to be able to check their calculations for mistakes by using approximations and the inverse operation.

Addition

Addition will start with children counting sets of objects. Then children will start to combine two sets of objects into one group. At this stage children may start to make informal jottings with simple pictures/dots to represent numbers.

Example

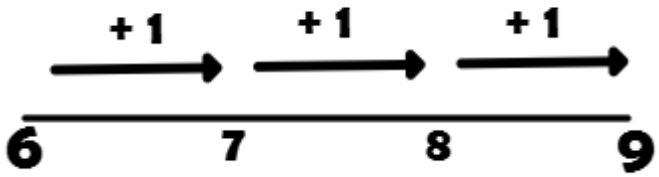
4 + 2 = 6

* * * * + * *

From Year 1 onwards children will start to use a number line and a number square. The number line starts to record the steps on the way to calculating the total.

Example

6 + 3



The mental methods that lead to column addition generally involve partitioning. Children need to be able to partition numbers.

Stage 2 & 3

The next stage is to record mental methods using partitioning. Add the tens and then the ones to form partial sums and then add these partial sums. Partitioning both numbers into tens and ones mirrors the column method where ones are placed under ones and tens under tens.

Example

47 + 76

40 + 70 = 110

7 + 6 =13

110 + 13 = 123

which is then recorded in a shorter form below

47 + 76 = 110 + 13 = 123

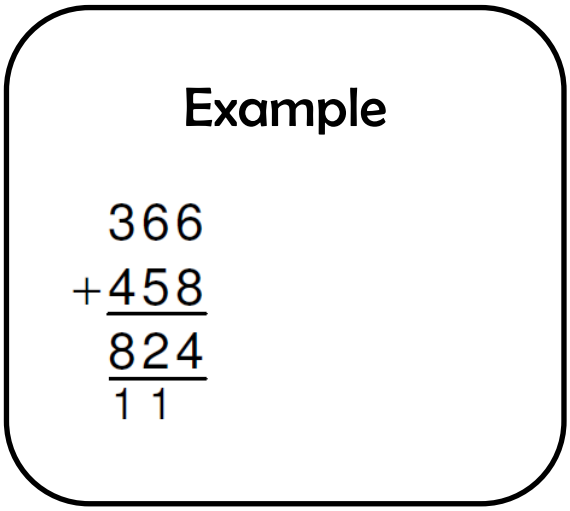
This can also be recorded like this:

$$\begin{array}{rcrcr} 40 & + & 70 & = & 110 \\ 7 & + & 6 & = & 13 \\ \hline & & & & 123 \end{array}$$

Stage 4

By year 3 children should be moving onto a layout showing the addition of the tens to the tens and the ones to the ones separately. **At this stage, ask the children to start by adding the ones first.**

By year 4 children should be able to use with confidence the compact written method where recording is reduced further. Carried digits are recorded below the line using the words ‘carry one ten’ or ‘carry one hundred’ and not ‘carry one’.



Subtraction

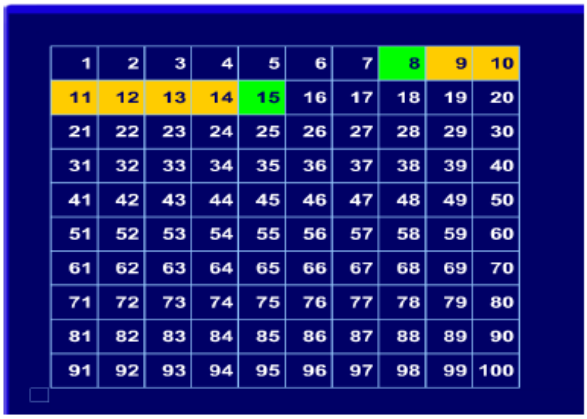
Mental methods should involve counting back in single digit numbers, leading to counting back in multiples of 10. Use of a number square might be useful.

Children can find subtraction difficult, particularly when they are introduced to column methods at an early stage when they are not ready for it. Children should be confident and secure in using a number line first.

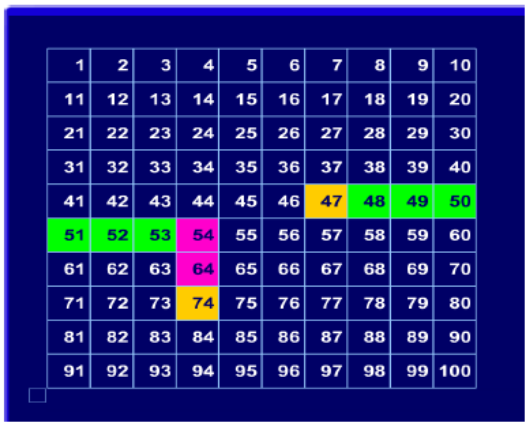
Stage 1

From year 1 onwards children should be using the number line to count backwards. As children move through the year groups this should become more complex with larger numbers.

Counting backwards using a number square is also an important concept that should be taught from year one onwards.



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

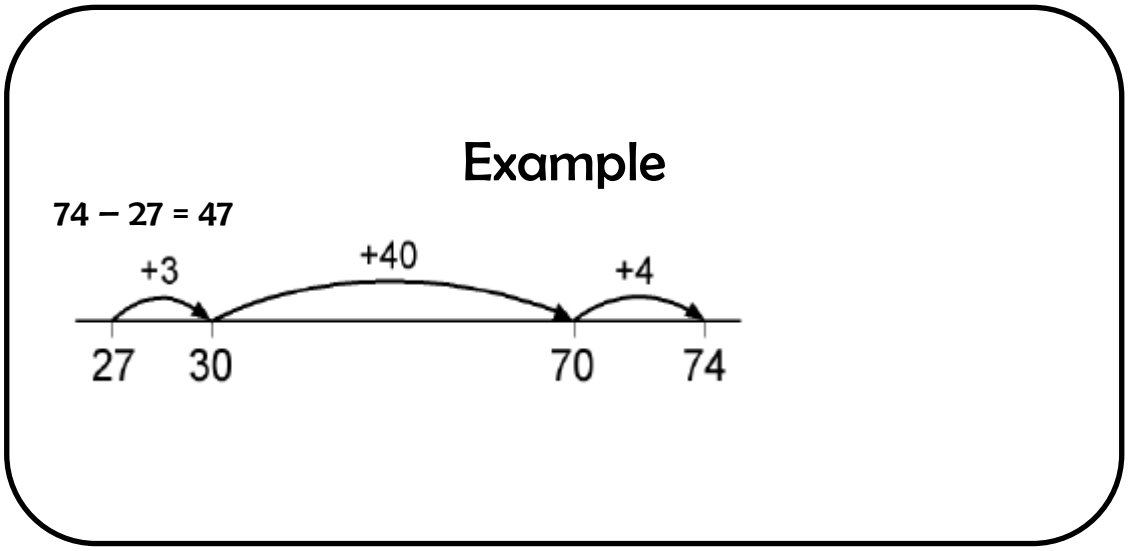


1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Stage 2

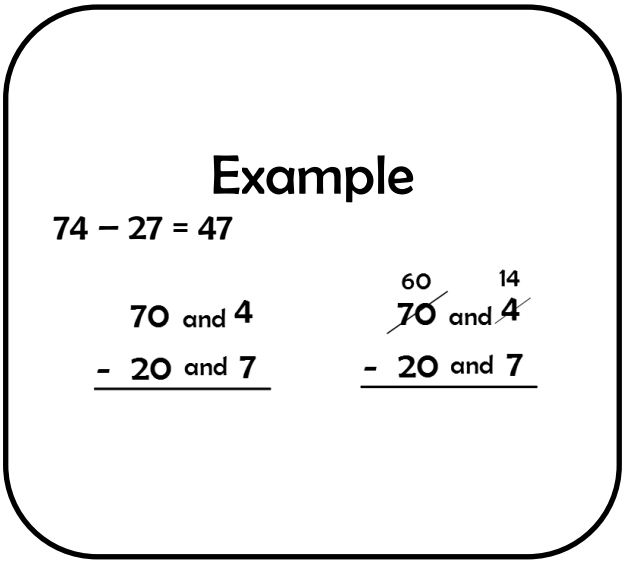
The mental method of counting up from the smaller to the larger number can be recorded using number lines.

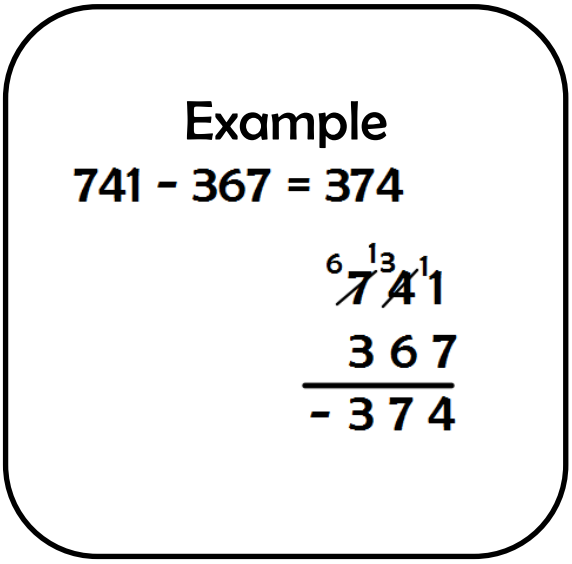
The number of jumps will vary. For some children, they will find it comfortable to make only two jumps along the line. Others will need more. Children usually find it easiest to make the first jump to the next 10.



Stage 3

By year 4 children should be working through the expanded layout to the compact column method. The language used should be 'take a ten' and not 'borrow'.





Multiplication

Early stages of multiplication will focus on groups and sets, leading onto the learning of multiplication tables facts up to 12 x 12. In the Early Years children will be counting in 2s, 5s and 10s using a number square to help them. By the end of year 2 most children should know their 2, 5 and 10 times tables. By the end of year 3 most children should also have learnt their 3 and 4 times tables and be starting to learn the 6, 7, 8 and 9 times tables. Most children should have a secure knowledge of all multiplication facts by the end of Year 4. Children should also know related division facts for the times tables, e.g. 64 divided by 8 = 8.

Stage 1

Children should be introduced to the idea of multiplication by repeated addition and grouping. The use of arrays can be used to help children see how 3 x 2 = 6 and 2 x 3 = 6 are related.

3 x 2 = 6

3 x 2 = 6 or 2 x 3 = 6

Stage 2

The next stage is to partition numbers to make them easier to multiply.

For example

13 x 5 =
10 x 5 = 50 3 x 5 = 15
50 + 15 = 65

This method will assist children in mental calculations.

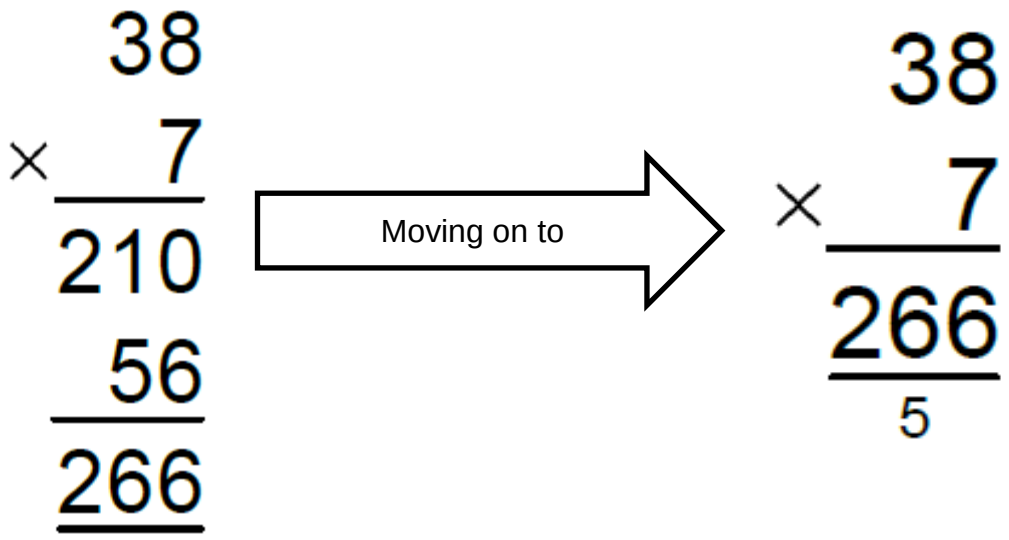
Stage 3

Although we recognise the grid method as assisting children in understanding the process of multiplication we want children to move onto efficient written methods as soon as possible. The grid method can be used to assist the teaching of multiplication but for the majority of children the learning of this method should not delay their progress onto a standard written method.

×	7
30	210
8	56
	266

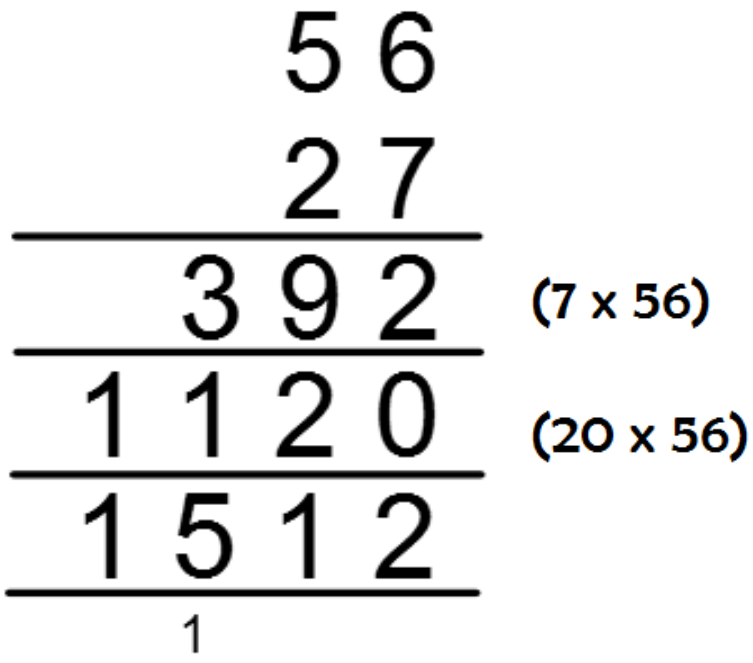
Stage 4

During year 4 children should be moving onto the standard written method for multiplying a two or three-digit number by a single digit number.



Stage 5

During year 5, children should be taught the standard written method for long multiplication. This should be regularly practised so that children are confident when applying this method during problem solving activities.



Division

Using written methods for division can be the most difficult for children. Early mental approaches should involve grouping and sharing. Discussing the sharing out of objects is an example and the children should have access to practical resources to help them visualise this as they start to learn about the process of division. When there are some left over, the term remainder can be introduced.

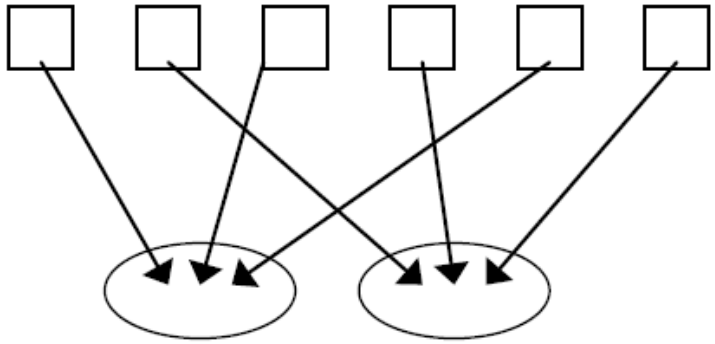
By the end of year 4 children should be able to derive and recall division facts for all tables up to 12 x 12.

Stage 1

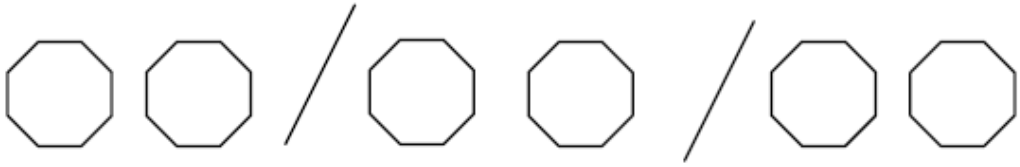
Sharing equally. Children will develop their understanding of division and use practical resources to support their calculation.

For example:

Six sweets shared equally between two people, how many do they get each?



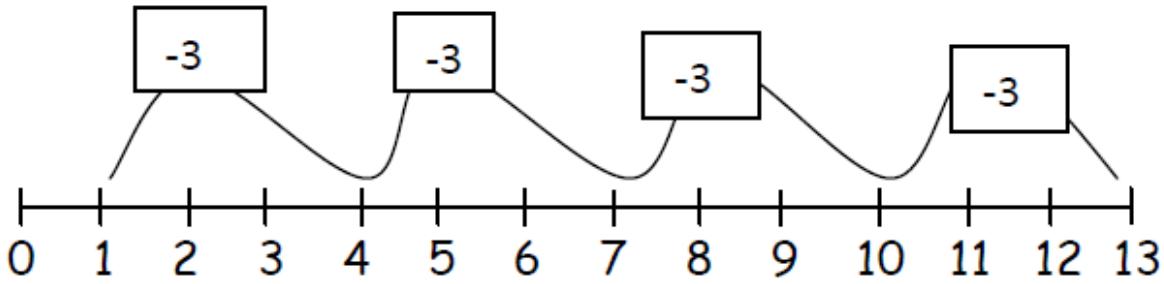
Or grouping can be used. There are six sweets, how many people can have two sweets each?



Stage 2

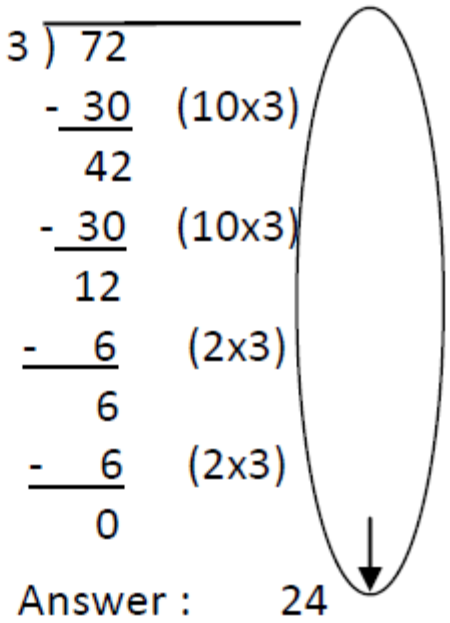
Children should then move onto calculations involving remainders through repeated subtraction.

$13 \div 3 = 4r1$



Children should then move onto setting out a division sum ready for a standard written method. As with the grid method for multiplication, the vertical repeated subtraction method can be useful in assisting children to understand the principle of division but for the majority of children this method should not delay them moving on to the standard written method.

$72 \div 3$



Stage 3

By year 4 children should be using a standard written method for dividing .

178 divided by 4

$$4\overline{)\,1^{1}7^{1}8}\quad 0\,4\,4\ \text{r}\,2$$

Stage 4

During year 5, children should be introduced to expressing the remainder as a decimal number and as a fraction.

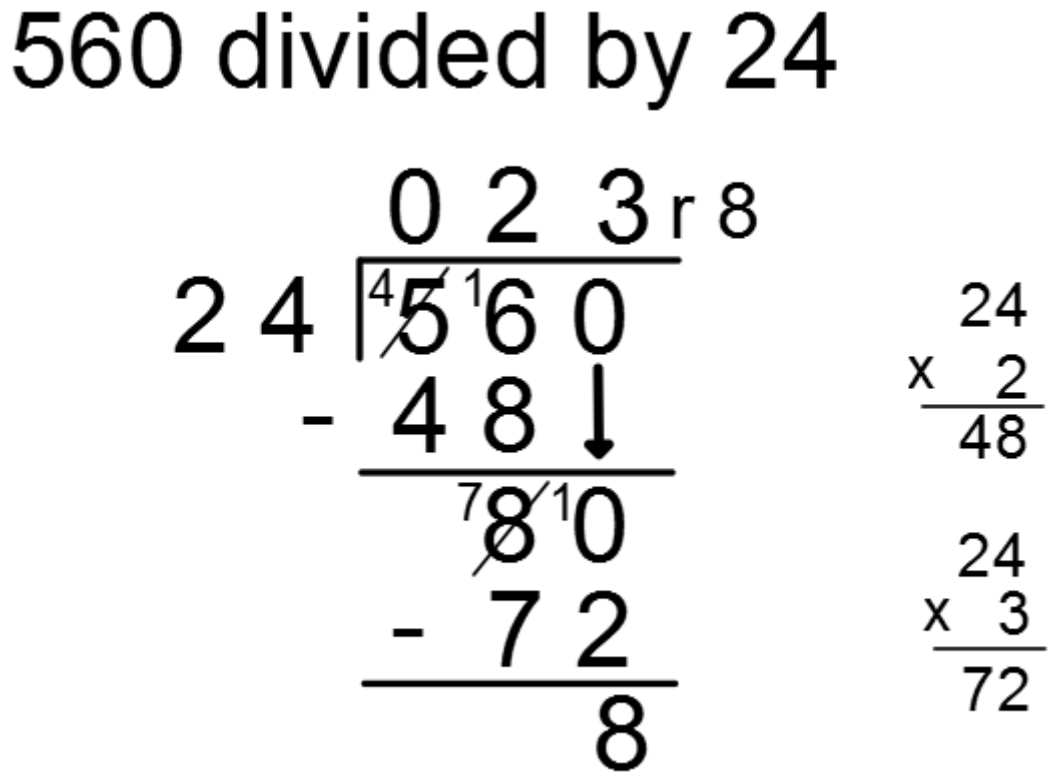
178 divided by 4

$$4\overline{)\,1^{1}7^{1}8^{2}.0}\quad 0\,4\,4.5$$

$$= 44\frac{2}{4} \quad = 44\frac{1}{2}$$

Stage 5

During year 6, children should be introduced to long division when the divisor is greater than 12. They should also be able to show the remainder as a decimal.



As has previously been stated, other methods can be used alongside to reinforce, extend and develop children's understanding where appropriate. However, children are expected to have a firm grasp of one formal method to enable them to apply the four rules in a variety of situations with confidence and efficiency.

Date of policy: March 2013