All Saints C of E
Infant and Nursery School

Selston C of E
Infant and Nursery School

Calculation Policy

September 2020

Opening hearts and minds through the grace and love of God

ALL SAINTS CHURCH OF ENGLAND (VA) INFANT SCHOOL AND PRE-SCHOOL

SELSTON CHURCH OF ENGLAND (VC) INFANT AND NURSERY SCHOOL

MISSION STATEMENT

Opening hearts and minds through the grace and love of God

At All Saints Infant School and Pre-School and Selston Infant and Nursery School children always come first and we try to nourish, challenge, prepare and inspire them within a Christian ethos.

We believe in valuing all who contribute towards the successful running of our schools including children, parents, carers, governors, teaching and non-teaching staff.

This Mission Statement lies at the heart of our schools' aims. It is the philosophical basis for all of the schools' policies and through these, for everything that happens in and round our schools. Our aspiration is for everyone at All Saints and Selston to:

- feel happy, secure, safe and valued at school
- develop a growing awareness of their own inner self and spirituality, and of the power of the Christian faith to transform lives
- develop healthy relationships based on care, trust, compassion and forgiveness
- show acceptance for and understanding of others who may have different beliefs or needs
- strive for the highest standards of achievement, developing the confidence and skills to be independent, motivated and self-disciplined learners
- have a positive approach to life, contributing to the well-being of the community and building hope for the future

We hope that children will leave our schools with open hearts and minds, ready to respond to the opportunities that lie before them and to experience the joy of life in all its fullness.

This document provides examples of progression through the various calculation methods to support problem solving using the four operations (addition, subtraction, multiplication and division). It is based on the Calculation methods detailed within the Big Maths – CLIC file, a tool which the school has adopted in the teaching of the areas of number and calculation in Mathematics. As such, the Big Maths – CLIC file folder provides additional detail to support in the learning and teaching of the methods detailed in this document.

Purpose of the Document

The purpose of the policy is to ensure consistent practice throughout the school thereby improving the understanding and attainment of pupils, in line with the development of mental and written calculations in addition, subtraction, multiplication and division. Written methods should always follow and support understanding. They are not age-related but progressive. It is important that pupils' calculation methods develop through each stage and do not move on to the next one until they are ready.

How the document is organised

The remainder of the document is organised into four separate sections, one for each of the four operations. Each operation progresses from high level understanding methods to short column methods. Column methods run alongside the high understanding methods and both should be taught as part of the children's mathematical journey. More detail for each step can be found in the CLIC folder.

Addition – Reception to Year 2

End of Year Progress Drive expectations –
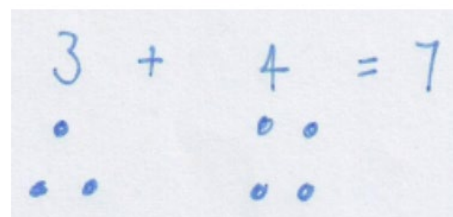
Reception: 1-5

Year 1: 5-12

Year 2: 12-24

Stage 1

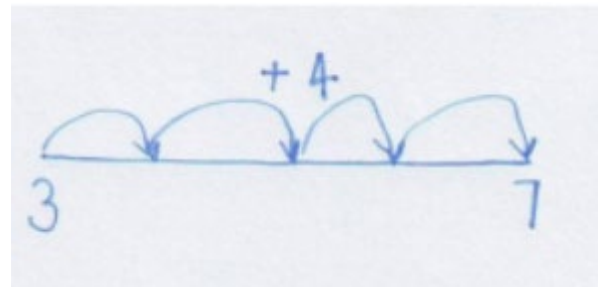Step 1: Using physical objects to count and add on.

Steps 2-5: Finding totals using objects up to 10.

Steps 6-8: Reading and understanding number sentences and solving using objects.
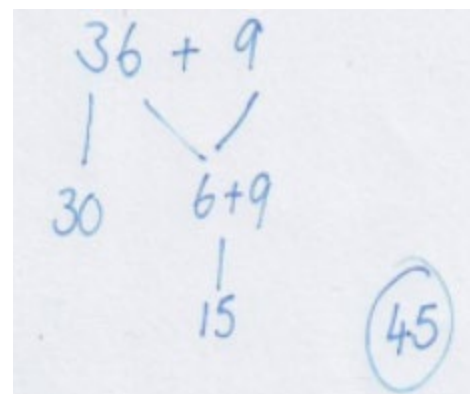
Stage 2

Steps 9-12: Use of prepared number lines to 20. Using an empty number line to record counting on (less formal presentation, used as jottings).

Steps 13-19: Use of 100 squares to add on in 1s, 10s and a combination of these.

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

Step 20-21: Use of 'partitioning' to add 2d + 1d.

Stage 3

Step 22-23: Use of partitioning to add 2d + 2d, starting with multiples of 10.

$$23 + 40$$

$$20 + 40 \qquad 3$$

$$60$$

$$63$$
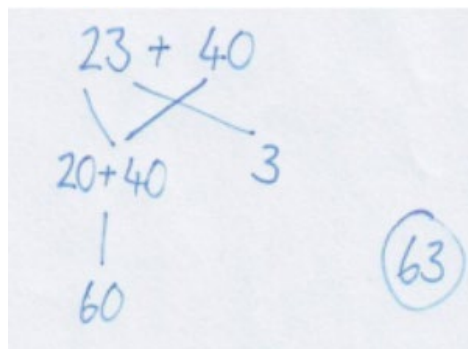
Step 24: Use of partitionaing to add any 2d + 2d.

$$43 + 52$$

$$40 + 50 \qquad 3 + 2$$

$$90 \qquad\qquad 5$$
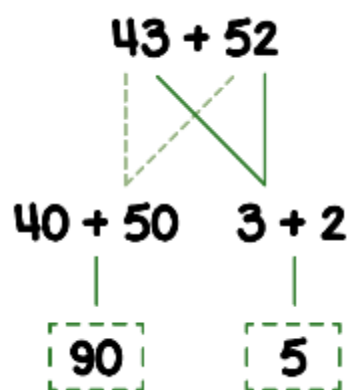
Addition Column Methods – Year 2

Step 1: Solve a 2d + 2d not crossing 10.

$$\begin{array}{r} 36 \\ + \ 42 \\ \hline 78 \\ \hline \end{array}$$

Subtraction – Reception to Year 2

**End of Year Progress Drive expectations –**

Reception: 1-5

Year 1: 5-12

Year 2: 13-27

Stage 1 and 2 focuses on the notion of counting back, whereas from Stage 3 to 5 the emphasis switches to counting on and 'finding the gap'. At Stage 3, children should understand why this is possible (subtraction being the opposite of addition).
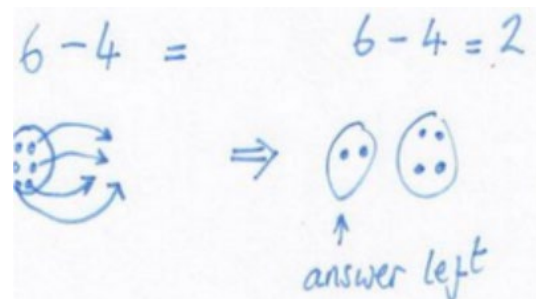
Stage 1

Steps 1-6: taking some objects away from a group.
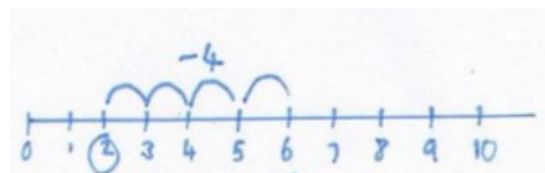Progressing to counting how many are left (all with the use of physical objects).

$$6 - 4 =$$
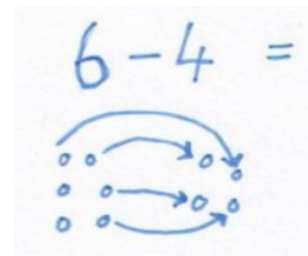
Stage 2

Steps 7-8: Arranging (then solving) a number sentence, physically setting out the objects.

$$6 - 4 =$$

$$6 - 4 = 2$$

answer left

Step 9: Count back on a structured number line.

-4

Steps 10-11: Using a structured number line or 100 square to subtract a one digit number from 20. **20 - 4 = 16**

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

Step 12: using an empty number line, with jottings if required.

$$16 - 7 =$$
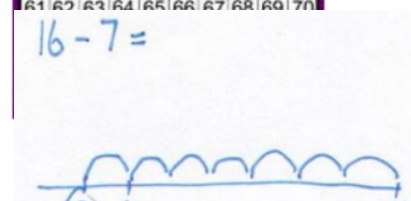
Step 13: Use of a 100 square to find a multiple of 10 and subtract 10.

70 – 10 = 60

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

Step 14: Use of a 100 square to find any two-digit number and subtract 10.

83 – 10 = 73

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

Step 15: Use of a 100 square to find a multiple of 10 and subtract a multiple of 10.

80 – 20 = 60

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

Step 16: use of a 100 square to find any two-digit number and subtract a multiple of 10.

83 − 20 = 63

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

Step 17: Use an empty number line to subtract 2d – 1d, not bridging tens.

Step 18: Use an empty number line to subtract 2d – 1d, including bridging.
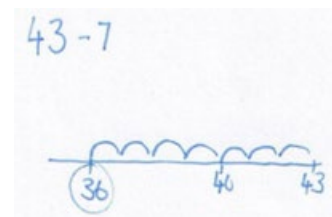
Stage 3

With the focus moving to counting on, each progression follows the pattern:

- Record numbers at either end of the empty number line (counting on left to right)
- Making two jumps (multiple of 10 where counting onto < 100, multiple of 100 where counting onto < 1,000)

Step 22: Finding the difference to the next multiple of 10.
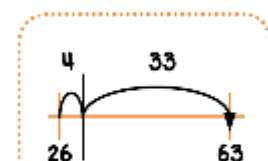
Step 24: Jumping from a multiple of 10.
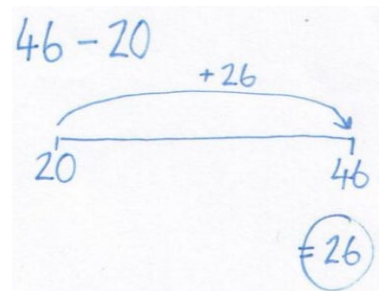
Step 25: Two jumps to solve 2d – 2d.
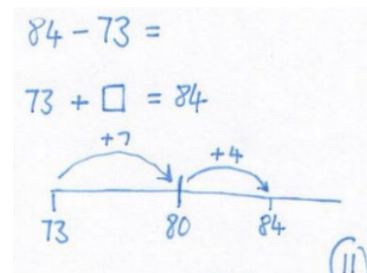
Step 27: Solve any 2d – 2d.

63 - 26

Subtraction Column Method – Year 2

Children should be taught this step after 'Basic Skills: Subtraction: Step 27', which ensures children can already understand subtracting a 2d number from a 2d number.

Step 1: Solve a 2d – 2d.

$$
\begin{array}{r}
96 \\
-\ 42 \\
\hline
54 \\
\hline
\end{array}
$$

Multiplication – Reception to Year 2

End of Year Progress Drive expectations –

Reception: 1-2

Year 1: 3-6

Year 2: 7-9

Stage 1

Steps 1-2: use of physical objects to find totals. E.g. 3 lots of 4 cars.

Steps 3-4: Transferring to more abstract objects. E.g. blocks / counts in groups.

Stage 2

Steps 5-6: Drawing groups of dots. E.g. 3 lots of 4 dots.

Step 7: Repeated addition.

Step 8: Reading 3 x 4 as 3 'lots of 4.

Stage 3

Step 9: Using 2, 3, 4 5 times table 'learn-its' to multiply 1d x1d, as children should have improving instant recall of these facts by this stage.

Division – Reception to Year 2
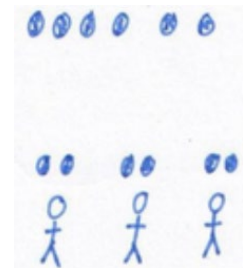
End of Year Progress Drive expectations –

Reception: 1-5
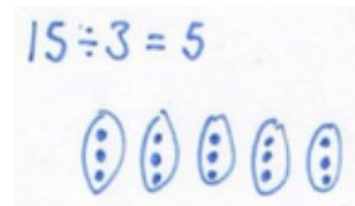
Year 1: 5-11

Year 2: 12-17

Stage 1

Steps 1-2: Sharing out objects equally / fairly. Asking, "How many will each person have?"

Steps 3-4: Sharing between two. Halving even numbers of objects.
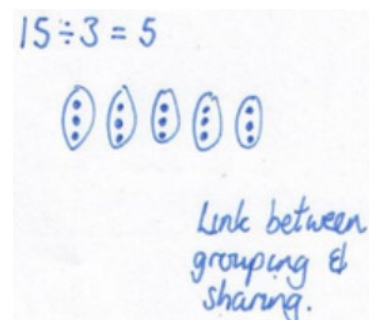
Stage 2

Step 5: Sharing 6, 9, 12, 15 objects between 3.

Step 6: Sharing 6, 9, 12, 15 objects into 3.

- Introducing the division symbol

Steps 7-8: Sharing 8, 12, 16, 20 between and into 4.

Step 9: Solving ÷2, ÷3, ÷4 division problems. E.g.   *e.g.*

$$10 \div 2 =, 6 \div 3 =, 12 \div 4 =$$

Steps 10-12: Making groups of 2, 5 or 10 and counting.

15 ÷ 3 is 15 counters in 5 groups of 3

Step 14: Physically solving a number sentence using objects and counting.

Step 15: Solve division, using objects (with remainders).   *17 ÷ 3 is 17 counters in 5 groups of 3 with 2 left over*

Stage 3

Step 16: Use of multiplication 'learn Its' for 2, 3, 4, 5 and 10 times tables to find division facts through 'fact families'.

Step 17: Extending use of multiplication 'learn Its' for 2, 3, 4, 5 and 10 times tables to find facts and remainders.