CALCULATION POLICY

Name of school: New End Primary

Date of policy: September 2014

Person responsible for policy review: Bernadette Warwick

Review date: September 2015

Policy development: This policy was written by the numeracy team in the summer term of 2014.

The numeracy team: Ellen Wood, Lisa Derby, Emma Halliday and Julie Gage. The numeracy team was led by Bernadette Warwick.

This policy contains the key pencil and paper procedures that will be taught within our school. It has been written to ensure consistency and progression throughout the school. Although the focus of the policy is on pencil and paper procedures it is important to recognise that the ability to calculate mentally lies at the heart of the new Numeracy curriculum. The mental methods in the new Numeracy curriculum will be taught systematically from Reception onwards and pupils will be given regular opportunities to develop the necessary skills. However mental calculation is not at the exclusion of written recording and should be seen as complementary to and not as separate from it. In every written method there is an element of mental processing. Sharing written methods with the teacher encourages children to think about the mental strategies that underpin them and to develop new ideas. Therefore written recording both helps children to clarify their thinking and supports and extends the development of more fluent and sophisticated mental strategies.

During their time at this school children will be encouraged to see mathematics as both a written and spoken language. Teachers will support and guide children through the following important stages:

• developing the use of pictures and a mixture of words and symbols to represent numerical activities;
• using standard symbols and conventions;
• use of jottings to aid a mental strategy;
• use of pencil and paper procedures;
• use of a calculator.

It is important that children do not abandon jottings and mental methods once pencil and paper procedures are introduced. Therefore children will always be encouraged to look at a calculation/problem and then decide which is the best method to choose, either pictures, mental calculation with or without jottings, structured recording or a calculator.
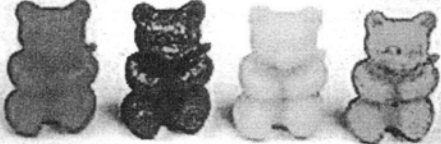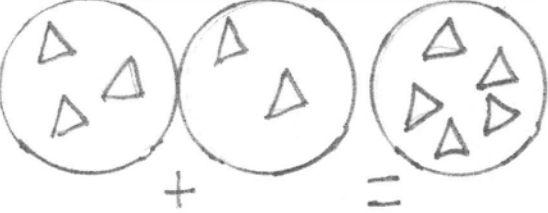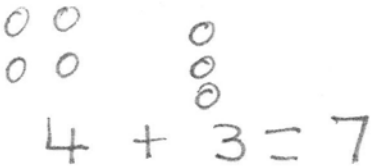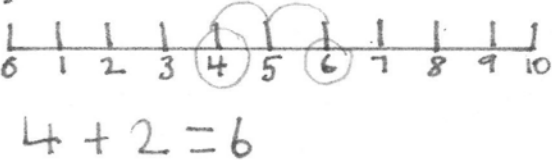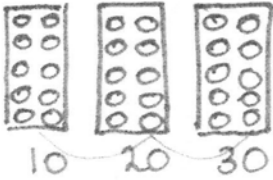
Development plan 2014/2015

- The calculation policy to be reviewed and agreed by staff.
- The calculation policy will be reviewed and agreed by governors.
- The calculation policy will be shared with parents and carers.
- To monitor implementation of the calculation policy through planning/book looks and lessons observations.
- To provide training for parents to improve knowledge of the teaching methods used in numeracy lessons.

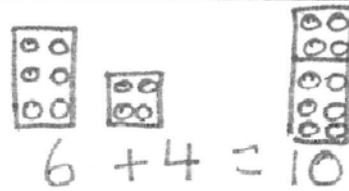With acknowledgement to Battle Primary School for their template and recording ideas.

CALCULATION POLICY   New End Primary School

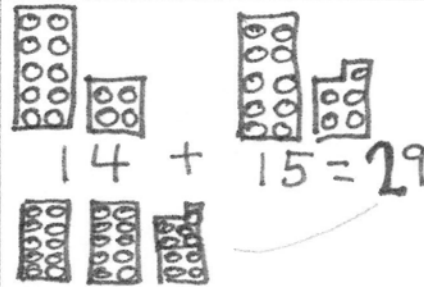These are the calculation methods taught throughout the school.

ADDITION

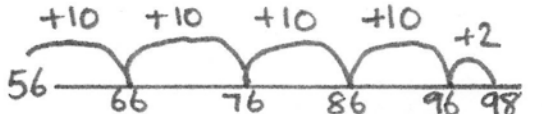| Key Stage 1	Example
Counting sets of objects.	
Combining two sets of objects into one group and counting.	
Drawing pictures/dots etc (informal jottings). Then counting how many altogether.	$4 + 3 = 7$
Counting on in ones on a numbered number line.	$4 + 2 = 6$
Counting in tens using Numicon.	10 20 30
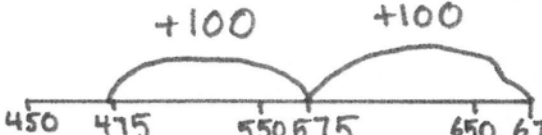
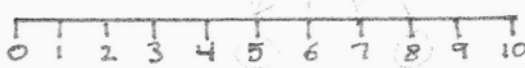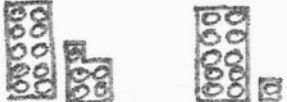| Using Numicon make number bonds to ten then twenty.	$6 + 4 = 10$
Using Numicon partition two digit numbers and add.	$14 + 15 = 29$
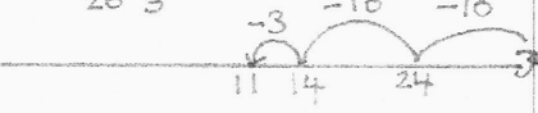
ADDITION

Key stage 2	Example
Using a number line count on in hundreds then thousands.	+100 +100 450 475 550 575 650 675
Add two digit numbers by partitioning second number and adding tens then ones on a number line.	$56 + 42 =$ 40 2 +10 +10 +10 +10 +2 56 — 66 76 86 96 98
Partitioned numbers are written under one another.	$47 + 76 =$ $40 + 7$ $70 + 6$ $110 + 13 = 123$
Expanded column addition with two three then four digit numbers.	$466 + 358$ $400 + 60 + 6$ $300 + 50 + 8$ $700 + 110 + 14 = 824$
Expanded column addition with carrying.	$466 + 358 =$ $400 + 60 + 6$ $300 + 50 + 8$ $800 + 20 + 4 = 824$ $100 \quad 10$
Compact column addition.	5347 $+ 2286$ 7633 $\quad 1 \; 1$

SUBTRACTION

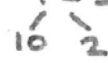| Key Stage 1	Example
Using practical equipment take some away.	
Subtraction using Numicon start with single digit numbers.	$10 - 4 =$ Place 4 on top of 10 and count uncovered holes.
Jump back on a numbered number line.	$8 - 3 = 5$
Using Numicon partition second number and subtract.	$15 - 11 = 4$ Partition second number. Place on top of first number and count uncovered holes.
Empty number line. Partition and jump back	$34 - 23 = 11$ 20 3 -3 -10 -10 11 14 24 34
Empty number line. Small difference, then jump forward.	$41 - 38 = 3$ +1 +1 +1 38 39 40 41

SUBTRACTION

Key stage 2	Example
Partitioned numbers are written under one another (beginning of column method)	73 - 22 = 51 70 3 -20 2 50 1
Exchange for 2 digit numbers. (These show the 2 steps which lead to the shortened version of column subtraction. Always start with the units number).	74 - 27 = 47 60 7̶0̶ 14 - 20 7 40 7
Exchange for 3 digit numbers	741 - 367 = 374 600 0 130 7̶0̶0̶ 0̶ 4̶0̶ 11 - 300 0 60 7 300 0 70 4
Compact column method	874 - 523 351
Compact column method with decomposition	⁸ ¹2 9̶ 3̶2 - 457 475

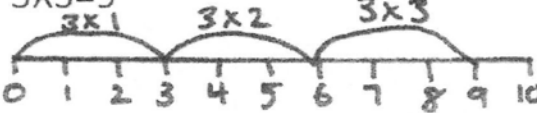| Partition the second number and subtract the tens then the units.	$36 - 12 = 24$ $\quad\quad\; \nearrow \;\nwarrow$ $\quad\quad 10 \quad 2$ $36 - 10 = 26$ $26 - 2 = 24$
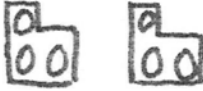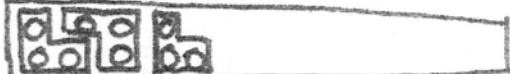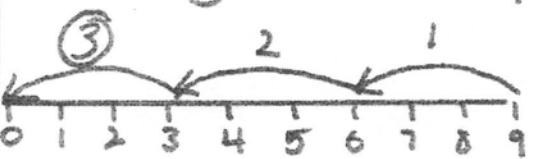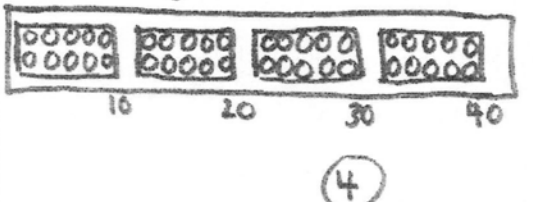
MULTIPLICATION

Key stage 1	Example
Counting out loud in repeated patterns of ones, twos, fives and tens (threes included for year two).	Any form of counting game which encourages counting back and forwards in repeated sequences of numbers.
Grouping using objects and then pictorial representation.	3X2=6
Grouping using Numicon.	3X2=6
Arrays	3X2=6 or 2X3=6
Repeated addition using a numbered number line/ Numicon.	3X3=9 3X3=9
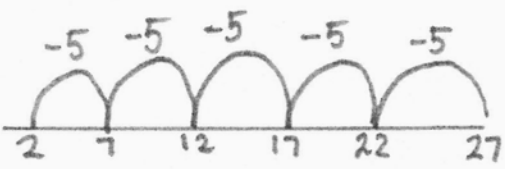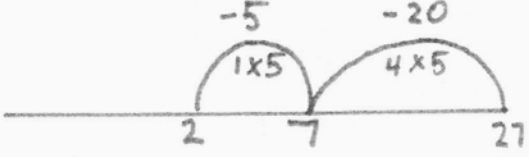
MULTIPLICATION

Key stage 2	Example
Partitioning	$13 \times 5 =$ $10 \quad 3$ $10 \times 5 = 50$ $3 \times 5 = 15$ $50 + 15 = 65$
The grid method (It is better to place the number with the most digits in the left hand column of the grid)	$7 \times 38 =$ | $\times$	7
30	210
8	56 | 266
Short multiplication column method	24×6 $\overset{2}{2}4$ $\times \quad 6$ $\overline{144}$ 342×7 $\overset{2}{3}\overset{1}{4}2$ $\times \quad 7$ $\overline{2394}$
Long multiplication column method	24×16 $\overset{2}{2}4$ $\times 16$ $\overline{144}$ 240 $\overline{384}$ 124×26 $\overset{1}{1}\overset{2}{2}4$ $\times \quad 26$ $\overline{744}$ 2480 $\overline{3224}$ $\quad 1 \quad 1$

DIVISION

Key stage 1	Example
Using jottings to show sharing.	6 sweets shared between 2 people. How many do they each get? ③
Grouping or repeated addition.	6 sweets. How many people can have 2 sweets each? 3 people
Repeated subtraction using a numbered number line.	How many 3s make 9?
Modelling using a Numicon number line.	How many 10s in 40? ④

DIVISION

Key stage 2	Example
Repeated subtraction to subtract multiples of the divisor (use multiples of 10, 5 and 2 to begin with)	$27 \div 5 = 5r2$ -5 -5 -5 -5 -5 2 7 12 17 22 27
Move onto using multiplication to divide on the number line	$27 \div 5 = 5r2$ -5 -20 (1x5) (4x5) 2 7 27

Then onto the vertical method.	$72 \div 3 =$
	
	   24
	3)72
	-30 (3x10)
	 42
	-30 (3x10)
	 12
	-12 (3x4)
	  0

Introduce subtracting larger multiples of ten (chunking)	$256 \div 7 = 36r4$ 7)256 (7x10) - 70 186 (7x20) -140 46 (7x6) - 42 4

Short division column method	$98 \div 7$ $496 \div 11 = 45\frac{1}{11}$

$$\begin{array}{r} 1\ 4 \\ 7\overline{)9^28} \end{array} \qquad \begin{array}{r} 4\ 5\ r\ 1 \\ 11\overline{)4\ 9^56} \end{array}$$

Long division column method	$432 \div 15$ $432 \div 15$

$$\begin{array}{r} 2\ 8\ r12 \\ 15\overline{)4\ 3\ 2} \\ 3\ 0\ 0 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \\ \hline 1\ 2 \end{array} \qquad \begin{array}{r} 2\ 8 \\ 15\overline{)4\ 3\ 2} \\ 3\ 0\ 0\ (15 \times 20) \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0\ (15 \times 8) \\ \hline 1\ 2 \end{array}$$

$$\frac{12}{15} = \frac{4}{5}$$
$$= 28\frac{4}{5}$$