New Hall Primary School and Children's Centre.

Calculations Policy
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<u>**Calculations Policy**</u>
<u>**For**</u>
<u>**New Hall Primary School and Children's Centre.**</u>

This policy outlines the teaching and progression of written methods taught at New Hall Primary School & Children's Centre. The school's policy for mathematics is based on ‑The Renewed Framework for teaching mathematics from Reception to Year 6 (2006).' This policy has been drawn up to ensure consistency and progression throughout the school. The policy outlines the written methods and strategies used in the four areas of number. It is the responsibility of all staff to ensure the agreed methods are taught and progression is followed.

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 Numeracy Strategy. The mental methods in the Framework for teaching mathematics should be taught systematically from Reception onwards and pupils should 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.

Children should be encouraged to see mathematics as both a written and spoken language. Teachers should 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.

This policy concentrates on the introduction of standard symbols, the use of the empty number line to aid mental calculation and on the introduction of other pencil and paper procedures. It is important that children do not abandon jottings and mental methods once other 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 - pictures, mental calculation with or without jottings, structured recording or a calculator. The long-term aim is for children to be able to select an efficient method (whether this be mental, written or in upper Key Stage 2 using a calculator) that is appropriate for a given task.

Addition

Mental calculations progressing to a formal written column method using carrying and adding least significant number first.

Subtraction

Mental calculations progressing to the formal written column method of decomposition. Subtracting least significant number first.
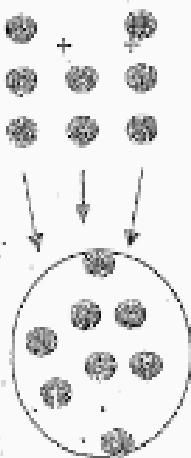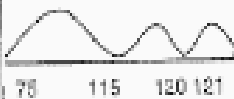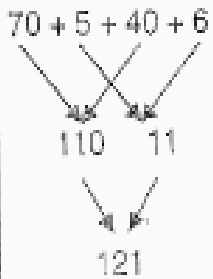
Multiplication

Mental calculations progressing to the use of arrays and the formal written grid method.

Division

Mental calculations progressing to the formal written method of chunking.

See progression sheets for examples of year group expectations.

Overview of progress in addition

Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Develop understanding through practical modelling, activities and discussions	Model the operation and represent using symbols and numbers	$\square + 14 = 100$ $16 + \triangle = 27$ Use apparatus to solve addition of two digit numbers Eg. 28 + 37 14 + 13 + 16	75 + 46 = +40 +5 +1 75 115 120 121 70 + 5 + 40 + 6 110 11 121 70 + 5 40 + 6 110 + 11	Approximating, setting out and preparing for carrying. Adding least significant digit first. 3 8 8 + 5 3 1 1 1 3 0 3 0 0 4 4 1	Approximating, adding least significant digit first and using carrying. 5 8 7 + 4 8 5 1 2 1 6 0 9 0 0 1 0 7 2 5 8 7 + 4 8 5 1 0 7 2 1 1	Approximating, adding least significant digit first, using carrying and extending to decimals. 6 5 8 4 + 5 8 4 8 1 2 4 3 2 1 1 1 1 4 0 3 . 2 0 6 0 . 8 2 + 0 . 5 1 4 6 4 . 5 3 1

Year 1: $\square + 4 = 8$ $\quad 4 + \triangle = 10$

Overview of progress in Subtraction (decomposition)

Foundation	Children are expected to experience the concept of subtraction and its associated vocabulary through practical modeling, activities and discussions
YEAR 1	Model the operation and represent using symbols and numbers. $\triangle - 4 = 6$ $16 - \square = 7$ Begin to use a numberline to support subtraction.
YEAR 2	Record mental calculations in number sentences. $\square - 14 = 10$ $100 - \square = 70$ Use a numberline to support subtraction.
YEAR 3	**Decomposition.** Begin to use expanded decomposition(TU-TU) Support skill development with base 10 materials. $81 = 80 + 1 = 70 + 11$ $-57 = 50 + 7 = 50 + 7$ $20 + 4 = 24$ Key Vocabulary – Partition, exchange
YEAR 4	**Decomposition.** Develop expanded decomposition(HTU-TU) Support skill development with base 10 materials. Leading to a more efficient notation. $754 = 700 + 50 + 4$ $700 + 40 + 14$ $7 \; {}^45 \; 4$ $- \; 46 = $ $40 + 6$ $\underline{\;\;\;\;40 + 6\;\;\;\;}$ $\underline{\;\;\;\;4 \; 6\;\;\;\;}$ $700 + 0 + 8 = 708$ $7 \; 0 \; 8$ Key Vocabulary – Partition, exchange

YEAR 5	Continue to develop expanded decomposition to HTU-HTU, leading to the efficient standard method. Extend to decimals.
	
	$754 = 700 + 50 + 4$
	$- 286 = 200 + 80 + 6$
	
	    $700 + 40 + 14$ ------ $7 \; {}^45 \; 4$
	    $\underline{200 + 80 + \;\; 6}$ $\underline{2 \; 8 \; 6}$
	
	    $600 + 140 + 14$ ------ ${}^67 \; {}^14 \; 5 \; 4$
	    $\underline{200 + 80 + \;\; 6}$ $\underline{2 \; 8 \; 6}$
	                    $4 \; 6 \; 8$
	    $400 + 60 + 8 = 468$

YEAR 6

Continue to develop the efficient written method and apply to large numbers, decimals and problem solving.

Calculate 6467- 2684

Approximate first: 6000 – 3000= 3000

$$
\begin{array}{r}
{}^{5}6\ {}^{3}4\ 6\ 7 \\
-\ 2\ 6\ 8\ 4 \\
\hline
3\ 7\ 8\ 3
\end{array}
\qquad
\begin{array}{r}
{}^{3}34\ .\ {}^{4}5\ 6 \\
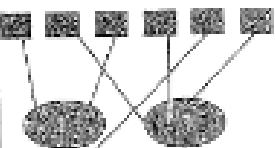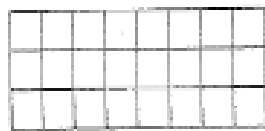2\ 5\ .\ 2\ 7 \\
\hline
9\ .\ 2\quad 9
\end{array}
$$
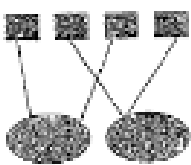
Throughout skill development in Keystage 2 pupils should approximate first by applying ROUNDING OFF strategies.

Base 10 materials should be accessible to all pupils to support skill development.

Overview of progress in multiplication

RECEPTION	Children are expected to experience the concept of multiplication and its associated vocabulary through **practical activities and discussions**.

YEAR 1	Understand the operation of multiplication as repeated addition using a numberline

YEAR 2

leading to 4 lots of 5 is 20
leading to 4 x 5 = 20

$4 \times 2 = 8$

$2 \times 4 = 8$

YEAR 3

Understand multiplication as:

1. repeated addition
2. an array

$5 \times 3 = 15$
$3 \times 5 = 15$
$15 \div 3 = 5$
$15 \div 5 = 3$

YEAR 4

13×3

10×3 3×3

x	10	3	
3	30	9	39

YEAR 5

72×38 is approximately $70 \times 40 = 2800$

x	70	2	
30	2100	60	2160
8	560	16	576
			2736

YEAR 6

217×37 is approximately approximately
$220 \times 40 = 8800$

x	200	10	7	
30	6000	300	210	6510
7	1400	70	49	1519
				8029

3.24×7 is

$3 \times 7 = 21$

x	3	0.2	0.04	
7	21	1.4	0.28	22.6

Overview of progress in division (Chunking)

Foundation	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Experience the concept of sharing and its associated vocabulary through practical modelling, activities and discussions	Understand the operation of division as sharing and grouping and the associated vocabulary through practical activities **SHARING EQUALLY** 4 apples between 2 children	Understand the operation of division as sharing and grouping and the associated vocabulary **SHARING EQUALLY** 4 apples between 2 children	Understand the operation of division and the associated vocabulary	Use informal pencil and paper methods to support, record and explain x and ÷	Develop and refine written methods for division	Develop and refine written methods for division

Year 1: GROUPING — 8 grouped into 2s, with number line 0 2 4 6 8

Year 2: GROUPING — Record simple divisions. 20÷△=2

Year 3:
$3 \times 8 = 24$
$24 \div 3 = 8$
How many lots/ groups are in ...?
number line 0 3 6 9 12 15
Understand the inverse relationship between x and ÷

Year 4:
$4 \overline{)96}$
$\underline{40} \quad 10\times4$
56
$\underline{40} \quad 10\times4$
16
$\underline{16} \quad 4\times4$
0
Answer 24
Develop recall of tables
Key vocabulary- chunking, divisor, multiple

Year 5:
$6 \overline{)196}$
$\underline{60} \quad 10\times6$
136
$\underline{60} \quad 10\times6$
76
$\underline{60} \quad 10\times6$
16
$\underline{12} \quad 2\times6$
4
Answer 32 r 4
☐ x 10
☐ x multiples of 10
Begin to give a quotient as a fraction 32 4/6
decimal-32.66

Year 6:
$27 \overline{)865}$
$\underline{540} \quad 20$
325
$\underline{270} \quad 10$
55
$\underline{54} \quad 2$
1
Answer 32 r 1
Give quotient as fraction and a decimal.
Introduce division of decimals through measure and money.