Loddington C of E Primary

Maths Calculation Policy

Below is a brief overview of the progression through the 4 calculations, colour coded from Yr.1 – 6

Written methods are taught as informal and formal, both are closely linked and must be seen as complementary to each other. Every written method has a component of mental processing so must be developed in conjunction with each other. Connections should be continually made.

All Teachers in all year groups will make clear their links to the C P A approach within planning.

Addition

<u>Reception</u>:

CONCRETE: Use physical objects – plastic counting teddies/bead strings/Numicon, modelled using **Part Whole Method**

PICTORIAL: Use picture/number representations/number lines modelled using **Part Whole Method**

ABSTRACT: Recorded as written calculations.

<u>Year 1</u>:

CONCRETE: Use physical objects – plastic counting teddies/bead strings two colour counters/Base 10/Number beads/multi-link cubes/10 frames modelled using **Part Whole Method**

PICTORIAL: Use picture/number representations/number lines modelled using **Part Whole Method/Bar model**

ABSTRACT: Recorded as written calculations, 5+3 =8   3=5=8 8=5+3 8=3+5

Yr.1 Number lines/100 squares

<u>Year 2</u>

CONCRETE: Use physical objects to represent each part of the calculation and use it to show related addition facts. **Part Whole Method**

PICTORIAL: Use picture representatives and structured number sentences to show related facts. **Part Whole Method/Bar model/Hundred square/number line**

ABSTRACT: Recorded as written calculations, see below.

Yr.2 Partitioning and recombining (Knowledge of near doubles/bonds/inverse)

Expanded written method before column addition P.14 PLACE VALUE COLUMNS LABELLED AS A REMINDER ABOUT THE VALUE OF DIGITS and numbers referred to as their actual value. Remember to use T for Tens and O for ones, not U for units.

<u>Year 3</u>

CONCRETE: Use physical objects such as base 10 and place value counters to add.

PICTORIAL: Use picture representatives/jottings. **Place value grids and counters Part Whole Method/Bar model/Hundred square/number line**
ABSTRACT: Recorded as written calculations – see below.

Yr.3 Empty number line/fact families/100 square, largest number first, partitioning and recombining, as per PDET course – horizontal presentation. Near doubles and nearest 10 to aid calc. Expanded written method, then if ready, to column addition. Progression as follows:

Place value grids and counters – adding 2/3 digit numbers with no regrouping.
Place value grids/counters/Base 10 to explore exchanging
Expanded written method
Column method – no exchange
Column method – including exchanges

Year 4

CONCRETE: Use physical objects such as base 10/plastic money to add.

PICTORIAL: Use picture representatives – coloured dots to represent digits/paper money set out in a place value grid.

ABSTRACT: Recorded as written calculations – see below.

Yr.4 Partition and recombine, column addition

Year 5

CONCRETE: Use place value counters to show exchange within a place value grid.

PICTORIAL: Use picture representatives – coloured numbers/circles within place value grid.

ABSTRACT: Recorded as written calculations – see below.

Yr. 5 Partition and recombine, column addition including decimals.

Year 6

CONCRETE: Use place value counters to show exchange within a place value grid.

PICTORIAL: Use picture representatives – coloured numbers/circles within place value grid.

ABSTRACT: Recorded as written calculations – see below.

Yr.6 Partition and recombine, column addition including decimals.

Language: Addend + Addend = Sum

Subtraction

<u>Reception</u>:

CONCRETE: Use physical objects – plastic counting teddies/bead strings modelled by taking away objects from the **whole**.

PICTORIAL: Use picture representations/number lines modelled using counting backwards.

ABSTRACT: Recorded as written calculations.   7-1=6

<u>Year 1</u>

CONCRETE: Use physical objects – plastic counting teddies/bead strings two colour counters/Base 10/Number beads/multi-link cubes/10 frames modelled using **Part Whole Method and Bar model**.   Model removing objects.

PICTORIAL: Use picture/number representations such as number lines and hundred squares modelled using counting back first and <u>then moving to counting on.</u>   Bar model and part whole model as a pictorial representation.

ABSTRACT: Recorded as written calculations, emphasis on related addition and subtraction facts.

Yr. 1 Number lines to count backwards and count up (as appropriate)

<u>Year 2</u>

CONCRETE: Use base 10 to show exchange using place value grid.

PICTORIAL: Use picture representatives and number lines/100 squares to annotate/cross off amounts.

ABSTRACT: Recorded as written calculations, see below.

Yr. 2 Concrete objects/pictorial representations/number lines/ 100 square. Progress to empty number line with counting up <u>not backwards</u> as recommended by PDET courses.

Column subtraction without decomposition first. 2 digit n0.

<u>Year 3</u>

CONCRETE: Use base 10/base money to find the difference. Use exchanging.

PICTORIAL: Children draw pictorial representations, showing regrouping in order to find the difference. Use of a number line also to count up.

ABSTRACT: Recorded as written calculations – see below.

Yr. 3 Empty number line to count up NOT backwards. Fact families.

Column subtraction with estimation and decomposition. Progression as follows:

Base 10/Place Value grids to subtract 2/3 digit numbers with no exchanges, then exchanges/regrouping Partitioning and recombining.

Formal column subtraction including exchanging in up to 2 columns

Year 4

CONCRETE: Use base 10/base money/place value counters to find the difference. Use exchanging.

PICTORIAL: Children draw pictorial representations, showing regrouping in order to find the difference.

ABSTRACT: Recorded as written calculations – see below.

Yr. 4 Use partitioning/ column subtraction

Year 5

CONCRETE: Use place value counters to make the number then regroup by exchanging, use of place value grid.

PICTORIAL: Children draw pictorial representations, showing regrouping in order to find the difference.

ABSTRACT: Recorded as written calculations – see below.

Yr. 5 Finding the difference/partitioning/column subtraction

Year 6

CONCRETE: Use place value counters to make the number then regroup by exchanging, use of place value grid.

PICTORIAL: Children draw pictorial representations, showing regrouping in order to find the difference.

ABSTRACT: Recorded as written calculations – see below.

Yr. 6 Finding the difference/partitioning/column subtraction

Language: Subtrahend – Minuend = Difference

Multiplication

<u>Reception</u>:

CONCRETE: Use physical objects to count in steps of 2, 10 and 5 to experience equal grouping. Use multi-link cubes to show doubling.

PICTORIAL: Use grouped pictures to help with verbal number sentence construction.

ABSTRACT: Recorded as stem sentences – There are 2 groups with 4 in each group.

<u>Year 1</u>:

CONCRETE: Use resources including toys/multi link/base 10/ bead strings to count in steps of 2, 5 and 10. Describe groups as 'lots of'

PICTORIAL: Use pictures in groups to count aloud and write numbers to match sequences. Use arrays.

ABSTRACT: Record as stem sentences, repeated addition and using x sign.

Yr.1 Objects/pictorial representations/arrays - to see patterns/steps of a constant size

<u>Year 2</u>:

CONCRETE: Use base 10 to partition and double. Count groups using bead strings and bar models. Create arrays from concrete resources. Reference to commutativity.

PICTORIAL: Draw pictures showing doubling. Use counting sticks, bar models for counting in multiples. Draw arrays and related facts.

ABSTRACT: Record as repeated addition and multiplication sentences.

Yr. 2   2, 5, 10, Commutativity   Concrete objects/pictorial representations/arrays/number lines/fact families

<u>Year 3</u>:

CONCRETE: Use physical objects to understand the link between multiplication and division. Use cubes/base 10/ place value counters to represent arrays.

PICTORIAL: Draw arrays of equal groups showing related facts. Use jottings to partition.

ABSTRACT: Record as expanded written method.

Yr.3 Arrays/number lines/fact families/multiplication square. Use of key facts to answer unknown facts. Partitioning when multiplying.

Expanded written method used before short multiplication. Short multiplication for TO x O NOT GRID METHOD

<u>Year 4:</u>

CONCRETE: Use physical objects to understand the link between multiplication and division. Use cubes/base 10/ place value counters to represent arrays. Multiply and divide numbers by zero and one using equal sized group representations.

PICTORIAL: Draw arrays of equal groups showing related facts. Use jottings to partition. Draw representations to show multiplying by 0 and 1.

ABSTRACT: Record as expanded written method/short multiplication.

Yr. 4 Arrays/number lines/fact families/multiplication square/use factors/associative law/partitioning

Expanded written method or straight to short multiplication

<u>Year 5:</u>

CONCRETE: Use physical objects to deepen understanding of multiplication and division links. Use place value counters and base 10 equipment. Use centicubes to explore square and cubed numbers.

PICTORIAL: Draw arrays of equal groups showing related facts. Partition multiplication with pictures.

ABSTRACT: Record as expanded written method/short multiplication.

Yr. 5 Models and images of arrays number lines/fact families/multiplication square/use factors/associative law/partitioning Choice of expanded written method or straight to short multiplication. NOT GRID METHOD. Expanded written method with 2 digit x 2 digit – least significant digit first.

<u>Year 6:</u>

CONCRETE: Use physical objects to deepen understanding of multiplication and division links. Use place value counters and base 10 equipment. Use centicubes to explore square and cubed numbers.

PICTORIAL: Draw arrays of equal groups showing related facts. Partition multiplication with pictures, including decimals.

ABSTRACT: Record as expanded written method/short multiplication.

Yr. 6 Models and images of arrays number lines/fact families/multiplication square/use factors/associative law/partitioning Choice of expanded written method or straight to

short multiplication. NOT GRID METHOD. Expanded written method with 2 digit x 2 digit – least significant digit first.

Long multiplication with least significant digit first. Second row add a zero!

Language: Multilicand x Multiplier = Product

Division

<u>Reception</u>:

CONCRETE: Use objects to physically share. Use even numbers to share equally.

PICTORIAL: Use picture representations to share in equal groups.

<u>Year 1</u>:

CONCRETE: Use objects to physically share into equal groups. Use stem sentences to reinforce. Begin to solve division problems which require sorting into groups.

PICTORIAL: Use picture representations to show equal groups. Bar model/number lines.

ABSTRACT: Begin to record as written calculations.   12 divided by 2 = 6 Use stem sentences to reinforce knowledge.

Yr.1 Objects/pictorial representations/arrays - to see patterns/steps of a constant size, sharing

<u>Year 2</u>:

CONCRETE: Use objects to share into equal groups. Use cubes to represent arrays and form related facts.

PICTORIAL: Use picture representations to share quantities. Use bar model to support understanding and number line to show grouping.

ABSTRACT: Begin to record as written calculations using the division symbol.

Yr. 2 Grouping and sharing explored, link with multipl/division with 2, 5, 10. Concrete objects/pictorial representations/arrays/number lines/fact families, link with doubling and halving.

<u>Year 3</u>:

CONCRETE: Use physical objects to understand the link between multiplication and division. Use cubes/base 10/ place value counters to represent repeated addition when grouping. Represent remainders too.

PICTORIAL: Draw arrays of equal groups showing related facts. Use jottings to partition. Use bar model and counting in groups of an amount on an empty number line.

ABSTRACT: Record as expanded written method.

Yr. 3 Arrays/number lines/ fact families/ multiplication square. Counting in groups on a number line. Partitioning when dividing – 92 divided by 4 = 80 divided by 4, then 12 divided by 4.   Expanded

written method only. Exploration of remainders through concrete/pictoral methods.

<u>Year 4</u>:

CONCRETE: Use physical objects to understand the link between multiplication and division. Use cubes to create arrays to support understanding of factors. Use base 10 to show traditional division calculation format.

PICTORIAL: Draw arrays of equal groups showing related facts. Find factors through using square paper as arrays.

ABSTRACT: Record as expanded written method then short division.

Yr. 4 Arrays/number lines/fact families/ multiplication square/ partitioning – 486 divided by 9   450 divided by 9, 36 divided by 9. Expanded written method or straight to short division.

<u>Year 5</u>:

CONCRETE: Use physical objects to deepen the link between multiplication and division. Use cubes to create arrays to support understanding of factors and prime/composite numbers. Use base 10 to show traditional division calculation format including remainders.

PICTORIAL: Draw arrays of equal groups showing related facts. Find factors through using square paper as arrays and prime numbers. Use place value grid to show movement.

ABSTRACT: Record as short division.

 Yr. 5 Arrays/number lines/fact families/ multiplication square/ partitioning – 486 divided by 9   450 divided by 9, 36 divided by 9.

Short division with remainders as numbers, fractions and decimals.

<u>Year 6</u>:

CONCRETE: Use physical objects to deepen the link between multiplication and division. Use cubes to create arrays to support understanding of factors/common factors and prime/composite numbers. Use base 10 to show traditional division calculation format including remainders.

PICTORIAL: Draw arrays of equal groups showing related facts. Find factors/common factors through using square paper as arrays and prime numbers. Use place value grid to show movement.

ABSTRACT: Record as below.

Yr. 6 Arrays/number lines/fact families/ multiplication square/ partitioning – 486 divided by 9   450 divided by 9, 36 divided by 9.

Short division with remainders as numbers, fractions and decimals. Long division with double digits – using fact boxes

Language: dividend divided by Divisor = Quotient