Rhodes Avenue Primary School Calculation Policy for addition Year 4

Informal methods to support mental Calculations

Practise mental methods with increasingly large numbers

Consolidate partitioning and re-partitioning
Use compensation for adding too much/little and adjusting
Use straws, Dienes, place value counters,
empty number lines etc.

$$55 + 37 = 55 + 30 + 7$$
$$= 85 + 7$$
$$= 92$$

+30   +7

55   85   92

I know that 63 + 29 is the same as 63 + 30 −1

Common mental calculation strategies:
Partitioning and recombining
Doubles and near doubles
Use number pairs to 10 and 100
Adding near multiples of ten and adjusting
Using patterns of similar calculations
Using known number facts
Bridging though ten, hundred
Complementary addition

Written Calculations

Add numbers with up to four digits, using the formal written (columnar) method

Add three digit numbers using columnar method and then move onto 4 digits.
Include decimal addition for money

789 + 642 becomes

```
    7  8  9
+   6  4  2
   _____
    1  4  3  1
       1  1
```

Answer: 1431

Revert to expanded methods if children find formal calculation method difficult

Representations to support mental and written calculations.

Use physical/pictorial representations alongside expanded and columnar methods.

Bundles of straws   Using Dienes

42 + 97

+100

43   140   143

Compensating in mental addition

£12.32
+ £11.81
_____
£24.13
   1

42 + 31 = 73

0 + 50 + 3
10 + 40 + 3
20 + 30 + 3
30 + 20 + 3
40 + 10 + 3
50 + 0 + 3

Re-partitioning

Place value cards & counters to counters, support the expanded method in readiness for the column

767 + 213 =

700 + 60 + 7
200 + 10 + 3

Ask what is the same and what is different about all these methods?

Fractions

Addition of fractions with the same denominator *to become fluent through a variety of increasingly complex problems beyond one whole*
Counting using simple fractions and decimals, both forwards and backwards

$\frac{2}{5} + \frac{3}{5}$

$\frac{1}{2} + \frac{2}{4} = \frac{2}{4} + \frac{2}{4} = 1$

½	¼
	¼

Links from other strands

- Estimate and use inverse operations to check answers.
- Solve addition and subtraction two step problems in context, deciding which operations and methods to use and why
- Identify, represent and estimate numbers using different representations. (Place value)
- Recognise the place value of each digit in a four-digit number.
- Estimate, compare and calculate different measures, including amounts money in £ and p (including fractions and decimals)
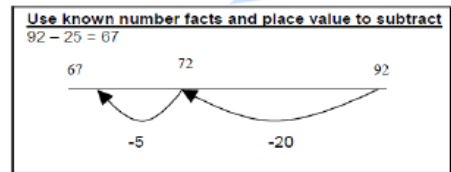
Mental Calculations

Continue to practise mental methods with increasingly large numbers to aid fluency. (*From Non– Statutory Guidance*).

Methods to support fluent calculation and encourage efficiency of method:

- Find a small difference by counting up.
  E.g. 5003—4996
- Subtract nearest multiple of ten and adjust.
- Partition larger numbers

Whenever possible, children should be encouraged to visualise number lines and other basic, supporting representations to promote fluent work without jottings.

This could be done using an empty number line. Children should recall and use number facts to reduce the number of steps.

Use known number facts and place value to subtract
$92 - 25 = 67$

| 67 | | 72 | | 92 |

-5   -20

Written Calculations

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

Build on formal, extended method (*See Year 3*) using exchange wherever necessary.

Continue to use representations and manipulatives to develop understanding of place value.
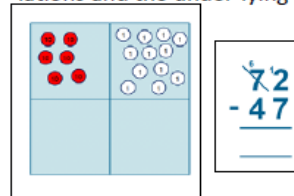
$$372 - 147 =$$

$$300 + 70 + 2$$
$$-100 + 40 + 7$$

→

$$300 + 60 + 12$$
$$-100 + 40 + \ 7$$
$$\overline{200 + 20 + \ 5}$$

→

$$300 + \cancel{70}^{60} + {}^1 2$$
$$- \ 100 + 40 + \ 7$$
$$\overline{200 + 20 + \ 5}$$

Apply understanding of subtraction with larger integers to that of decimals in context of money and measures. (See Year 5.)

**Representations to support mental and written calculations.**

72 - 47

This is now "Sixty-twelve"
$\cancel{7}^6 {}^1 2$
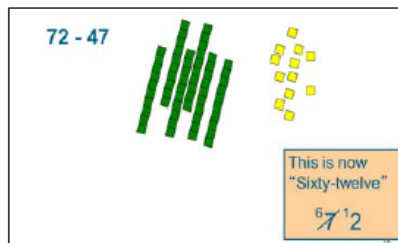
Dienes blocks or place value counters can be used to model calculations and the under-lying place value concepts.

$\cancel{7}^6 {}^1 2$
$- 4 \ 7$

I would count on using a number line to calculate 5003-4896; because the numbers are close together.

Use physical and / or pictorial representations and expanded algorithms alongside columnar methods. Ask: *What is the same? What's different?* Compare and discuss the suitability of different methods in context. Pupils **decide which operations and methods to use and why.**

Fractions

$$\frac{6}{7} + \frac{3}{7} = \frac{9}{7}$$

$$\frac{9}{7} = 1\frac{2}{7}$$
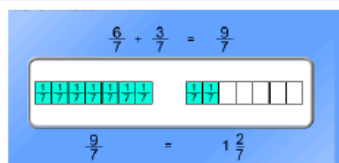
Count up and down in hundredths.
Add and subtract fractions with the same denominator .
Solve simple measure and money problems involving fractions and decimals to two decimal places.

Links from other strands

Identify, represent and estimate numbers using different representations. (*Place value*)
Recognise the place value of each digit in a four-digit number.
Estimate and use inverse operations to check answers to a calculation .
Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.
Estimate, compare and calculate different measures, including money in pounds and pence.

Informal methods to support mental Calculations

- **recall multiplication and division facts for multiplication tables up to 12 × 12**
- **use place value, known and derived facts to multiply and divide mentally, including:**
  - **multiplying by 0 and 1;**
  - **dividing by 1;**
  - **multiplying together three numbers**
- **recognise and use factor pairs and commutativity in mental calculations**
- practise mental methods and extend this to three-digit numbers to derive facts, (for example $600 \div 3 = 200$ can be derived from $2 \times 3 = 6$)

> Using the **distributive** law:
> $39 \times 7 = 30 \times 7 + 9 \times 7$
> Using the **associative** law:
> $(2 \times 3) \times 4 = 2 \times (3 \times 4)$

> Using facts and rules:
> $2 \times 6 \times 5 = 10 \times 6 = 60$

Written Calculations

- **multiply two-digit and three-digit numbers by a one-digit number using formal written layout**
- Estimate before calculating
- Ensure written methods build on/relate to mental methods (e.g. grid method)
- Introduce alongside grid and expanded column methods

> Key skills to support:
> - know or quickly recall multiplication facts up to 12 × 12
> - understand the effect of multiplying numbers by 10, 100 or 1000
> - multiply multiples of 10, for example, 20 × 40;
> - approximate, e.g. recognise that 72 × 38 is approximately 70 × 40 = 2800 and use this information to check whether their answer appears sensible

	50	4
4	200	16

➡

$$\begin{array}{r} 54 \\ \times\ 4 \\ \hline 16\ (4 \times 4) \\ 200\ (50 \times 4) \\ \hline 216 \end{array}$$

➡

$$\begin{array}{r} 54 \\ \times\ 4 \\ \hline 216 \\ {\scriptstyle 1} \end{array}$$

Revert to expanded methods if children find formal calculation method difficult

Representations to support mental and written calculations.

Ensure children can confidently multiply & divide by 10 and 100, that multiplying by 10 makes the number bigger and all digits move one place to the left, while dividing by 10 makes the number smaller and all the digits move one place to the right.

Moving digits ITP

This digit is worth 200

$$\begin{array}{r} 245 \\ \times\quad 6 \\ \hline 1470 \\ {\scriptstyle 2}\quad{\scriptstyle 3} \end{array}$$

This digit is worth 30

I can use place value counters to model the grid method

Use arrays made with place value counters to demonstrate the link between multiplication and division. This will support understanding of the grid method.

Children need to understand and apply the language of multiples and factors and use it in solving multiplication and division problems, for example, 'All factors of 36 are multiples of 2, true or false? Find me two factors of 48 that are also multiples of 3.'

Fractions

- **recognise and show, using diagrams, families of common equivalent fractions**
- understand the relation between non-unit fractions and multiplication and division of quantities, with particular emphasis on tenths and hundredths.
- make connections between fractions of a length, of a shape and as a representation of one whole or set of quantities.
- use factors and multiples to recognise equivalent fractions and simplify where appropriate

$$\frac{4}{10}\ \frac{6}{15}\ \frac{8}{20}\ \frac{10}{25}\ \frac{12}{30}\ \frac{14}{35}\ \frac{16}{40}$$

$$\frac{2}{5} = \frac{16}{40}$$

Links from other strands

- **solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.**
- **Convert between different units of measure (e.g. km to m) - use multiplication to convert from larger to smaller units**
- *Understand the relation between non-unit fractions and multiplication/division of quantities. With particular emphasis on tenths and hundredths*
- *relate area to arrays and multiplication.*
- Problem solving work can involve finding all possibilities and combinations drawing on knowledge of multiplication tables facts
- *Pupils understand and use a greater range of scales in their representations (Statistics)*

Rhodes Avenue Primary School Calculation Policy for division Year 4

Informal methods to support mental Calculations

Pupils should be taught to:
- recall multiplication and division facts for multiplication tables up to 12 × 12
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations

> I know that 6÷3=2, so 600÷3=2.

Using known facts and blank arrays to calculate 176÷8.

176÷8 = 22

Pupils practise mental methods and extend this to three-digit numbers to derive facts.

Written Calculations

Pupils should be taught to:
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers .

Revert to expanded methods if children find formal calculation method difficult

Representations to support mental and written calculations.

693 ÷ 3

2 3 1
3

By working through larger number calculations with manipulatives, children gain experience of exchange (re-partitioning) within division algorithms.

492 ÷ 4

1 2 3
4

Children can work in pairs: child A constructs the array (dividing manipulatives into 3 rows), child B checks it and records this in a formal, short division format.

By the end of Year 4, children need to have encountered remainders in a number of contexts. Pupils can be introduced to remainders using known facts: e.g. 13÷4; and then progress to larger numbers. (See below).

200 ÷ 6 = 33 r.2

30 + 3

Remainder 2

6

Money can be used instead of place value counters.

Fractions

Pupils should be taught to:
- *recognise and show, using diagrams, families of common equivalent fractions*
- *recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.*
- *solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number*
- *find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths*

Links from other strands

- **Convert between different units of measure [for example, kilometre to metre; hour to minute]**
- **Estimate, compare and calculate different measures, including money in pounds and pence (MEASURES)**
- **Recognise that hundreths arise when dividing an object by one hundred and dividing tenths by ten. (FRACTIONS)**