

Water Street CP School.

Calculation and Arithmetic Policy.

The following document is to provide a detailed overview of calculation and arithmetic strategies, alongside recall facts, to be used throughout the school.

The document should provide a useful reference for all classes from EYFS though to Year 6.

The aim of the document is that children should:

- Have a secure understanding of key number facts (Known as recall facts)
- Make use of jotting, diagrams and appropriate resources to help support and develop understanding
- Use written strategies efficiently, confidently and accurately.

Whilst working on calculations, children should be encouraged to choose the right strategy for the right calculation, being aware of the following:

Do I know the answer because it is a fact I have learnt?

Can I work it out easily in my head?

Can I use some equipment or a jotting?

Do I need to use the written method?

There are 6 parts to the document:

- **Place Value:** An overview of the key place value objectives for each year group.
- **Concrete Resources:** Examples of a range of concrete resources used throughout the school in the teaching of number.
- **Using base 10:** A guide to effective use of base 10 for addition and subtraction calculations.
- **Progression in Calculation Strategies:** A sequential overview of the Concrete, Pictorial and Abstract (CPA) approaches that should be used in each year group, when teaching the four rules of number (addition, subtraction, multiplication and division)
- **Arithmetic Guidance-** including examples of how these can be developed
- **An overview of Key Recall Facts:** These consistently form the "building blocks" for carrying out effective and efficient written and mental strategies

The document has used as it's basis White Rose Maths Hub (Surrey plus) Calculation Guidance, as well as the Lancashire Maths Team Arithmetic progression document (2019) .

Teaching should especially plan to use concrete resources and representations when learning is new.

All children should have experience of the CPA approach, and follow the progression of calculation strategies in this document appropriate for their year group. Some children may rapidly grasp the strategies, with less reliance on concrete and pictorial representations.

Children who struggle to grasp particular calculation strategies, should continue to use concrete and pictorial representations, and may need to revisit methods used in previous year groups.

The following document should be used by teaching and support staff, and may also be a useful aid for parents in supporting their children in their work at home.

The document is also available on the school website.

September 2022

Jenny Macnab Maths Curriculum Leader

Section 1:

Place Value, Concrete Resources and Using Base 10:

- Place Value Pages Page 1 and 2
- Concrete Resources Pages 3-7
- Using Base 10 Page 8-10

Section 2:

Progression in Calculation Strategies:

- Calculating in EYFS Page 1-6
- Addition Pages 7-12
- Subtraction Pages 13-12
- Multiplication Pages 21-28
- Division Page 29-36

Section 3:

Arithmetic Guidance:

- Year 1 Page 1
- Year 2 Page 2-3
- Year 3 Pages 4-6
- Year 4 Pages 7-11
- Year 5 Pages 12-17
- Year 6 Pages 17-20

Section 4:

An Overview of recall facts

Section 1:

Place Value, Concrete Resources and Using Base 10

- Place Value Page 1 and 2
- Concrete Resources Pages 3-7
- Using Base 10 Page 8-10

Early Years and Key Stage 1– Place Value understanding

<p>Early Years: Number and Numerical Pattern.</p>	<p style="text-align: center;"><u>Number and Numerical Pattern</u></p> <ul style="list-style-type: none"> • Count objects, actions and sounds. • Subitise. • Link the number symbol (numeral) with its cardinal number value. • Count beyond ten. • Compare numbers. • Understand the 'one more than/one less than' relationship between consecutive numbers. • Explore the composition of numbers to 10. • Automatically recall number bonds for numbers 0–10.
<p>Year 1</p>	<ul style="list-style-type: none"> • count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number • count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens • given a number, identify one more and one less • identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least • read and write numbers from 1 to 20 in numerals and words.
<p>Year 2</p>	<ul style="list-style-type: none"> • count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward • recognise the place value of each digit in a two-digit number (tens, ones) • identify, represent and estimate numbers using different representations, including the number line • compare and order numbers from 0 up to 100; use <, > and = signs • read and write numbers to at least 100 in numerals and in words • use place value and number facts to solve problems.

Key Stage 2– Place Value Understanding

Year 3

- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1000 in numerals and in words
- solve number problems and practical problems involving these ideas.

Year 4

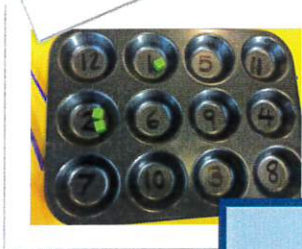
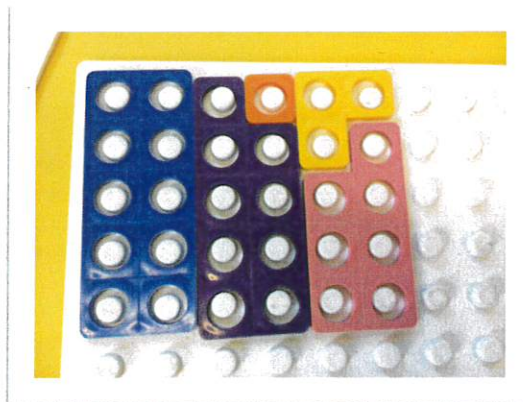
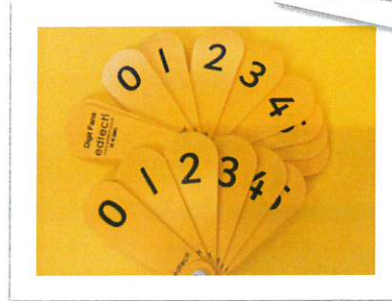
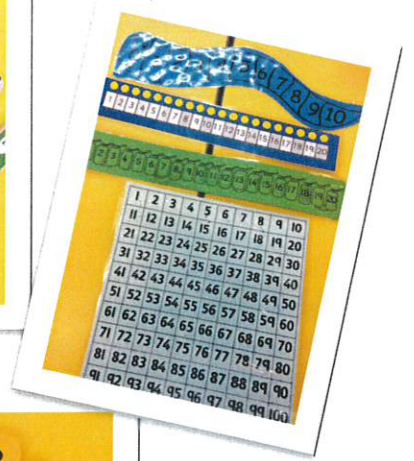
- count in multiples of 6, 7, 9, 25 and 1000
- find 1000 more or less than a given number
- count backwards through zero to include negative numbers
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- order and compare numbers beyond 1000
- identify, represent and estimate numbers using different representations
- round any number to the nearest 10, 100 or 1000
- solve number and practical problems that involve all of the above and with increasingly large positive numbers
- read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.

Year 5

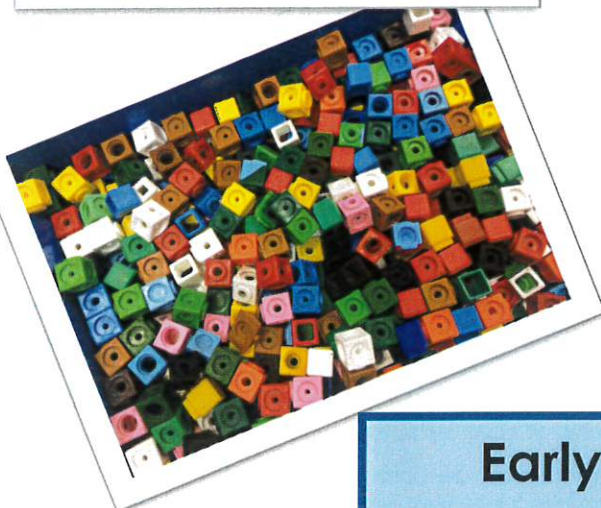
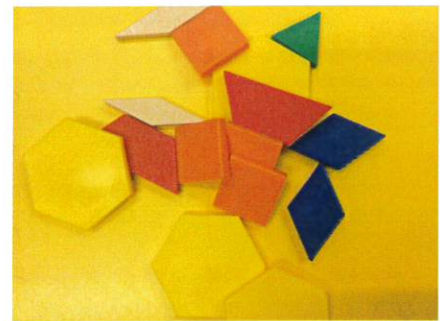
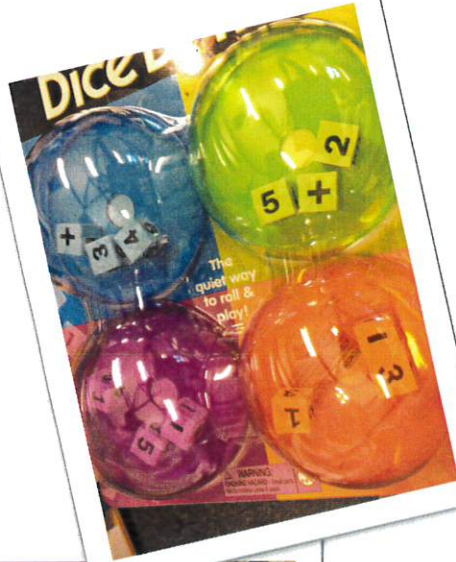
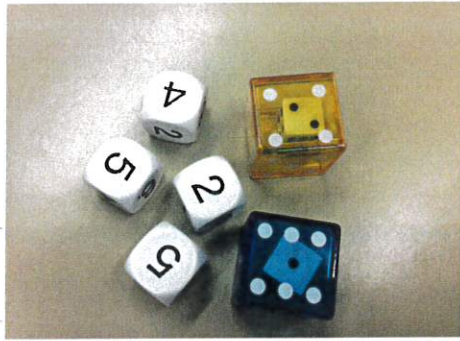
- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero
- round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- solve number problems and practical problems that involve all of the above
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Year 6

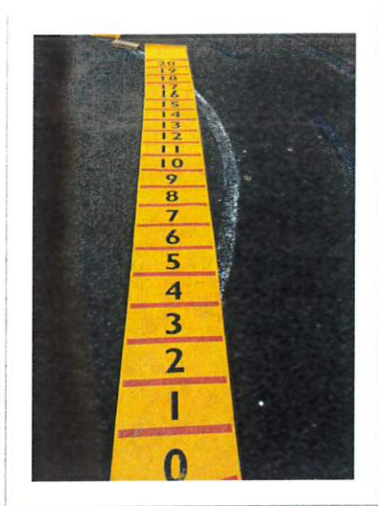
- read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- round any whole number to a required degree of accuracy
- use negative numbers in context, and calculate intervals across zero
- solve number and practical problems that involve all of the above.



Early Years and Key Stage 1 Place Value Resources



Early Years and Key Stage 1 Place Value Resources



Early Years- Outdoor provision for maths

-1

$5 - 1 = 4$
 $4 - 1 = 3$
 $3 - 1 = 2$
 $2 - 1 = 1$
 $1 - 1 = 0$

$5 - 1 = 4 - 1 = 3 - 1 = 2 - 1 = 1 - 1 = 0$

t e n

$5 + 5 = 10$
 $10 = 5 + 5$

$5 + 5 = 10$

$7 + 1 = 8$

sixteen

$10 + 6 = 16$

the numberblock express

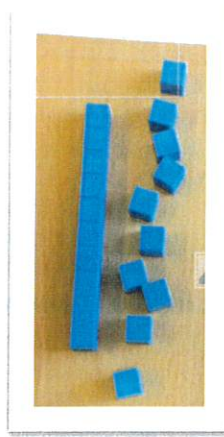
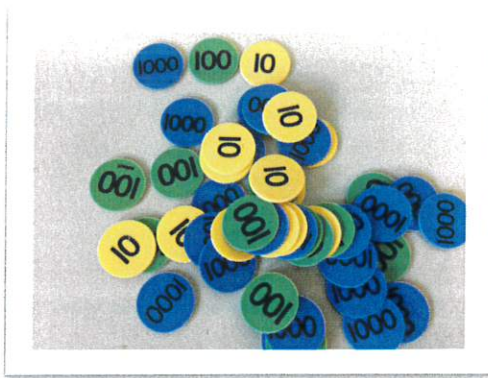
$5 + 0 = 5$
 $2 + 3 = 5$
 $1 + 4 = 5$
 $1 + 2 + 2 = 5$
 $1 + 1 + 3 = 5$

What's the difference?

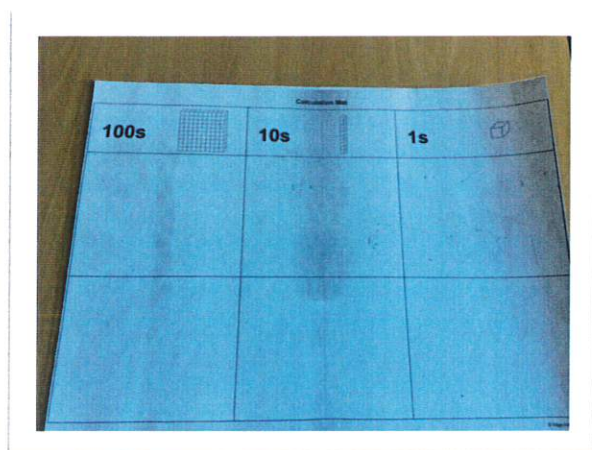
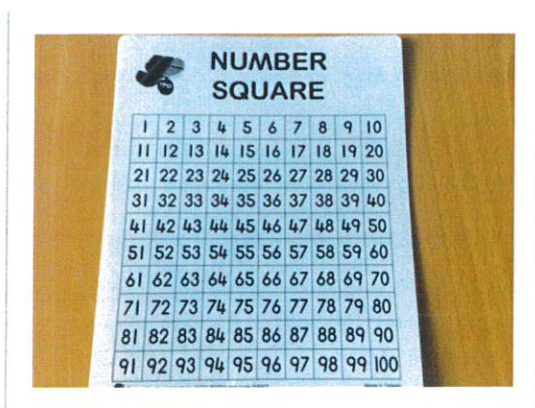
lots of

1×12 , 3×4 , 4×3 , 2×6 , 6×2 , 12×1

EYFS Floor Book Examples



Key Stage 2 Place Value Resources



Addition using Base 10

56
+ 2

Combining the tens with the units to make the total

56
+ 2
—
58

Addition using Base 10—using exchanging and regrouping

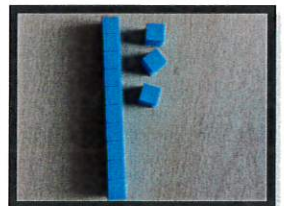
46
+ 7

Combining the units to make the total. (13 units) = 1 ten and 3 ones

$$\begin{array}{r} 46 \\ + 7 \\ \hline 53 \\ \hline 1 \end{array}$$

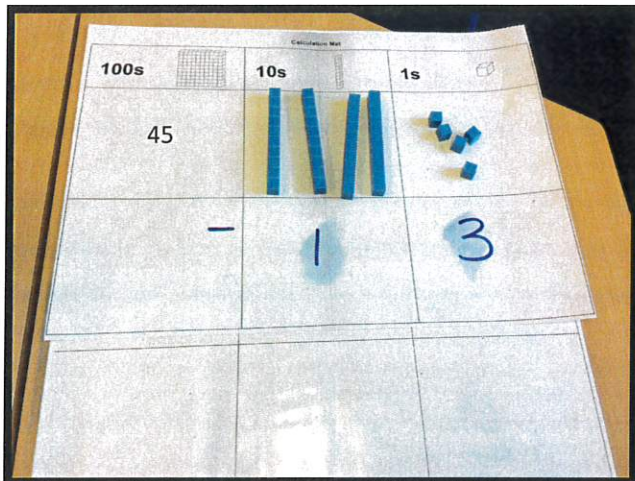
Exchange and regroup:

Change the 10 ones into a ten and place this in the tens column



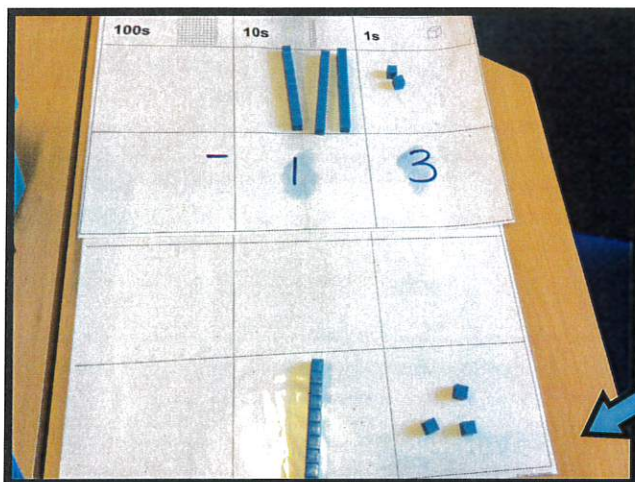
This ten is now carried into the tens column. Children may place their carried ten anywhere in this column as long as they remember to include it in their final total.

Subtraction using Base 10



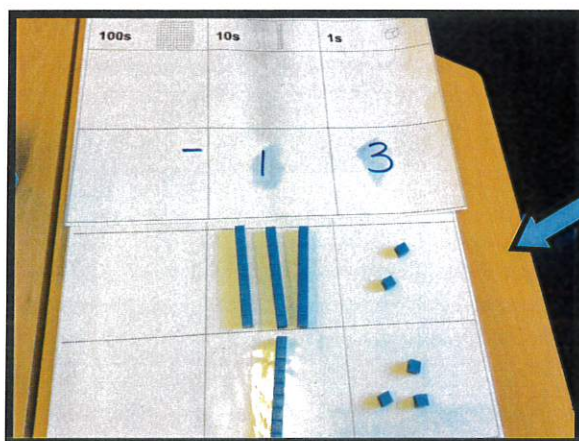
$$45 - 13 =$$

$$\begin{array}{r} 45 \\ -13 \\ \hline \end{array}$$



Take away 3 ones and 1 ten from 45 and place them at the bottom of the grid

$$\begin{array}{r} 45 \\ -13 \\ \hline \end{array}$$



Move down the remaining base ten cubes to show your answer.

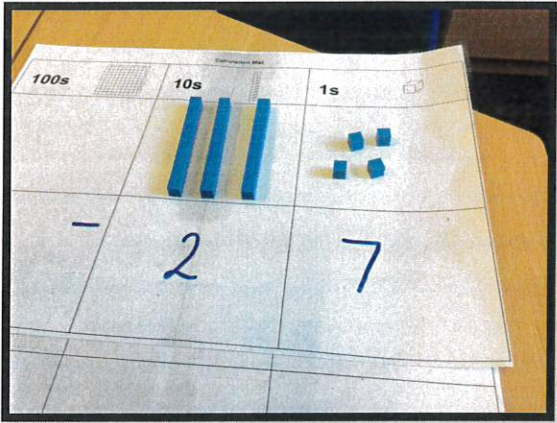
$$\begin{array}{r} 45 \\ -13 \\ \hline 32 \end{array}$$

At the same time as doing the calculation pupils will also learn how to record it as shown above.

We can also now use this to check the inverse operation-

$$13 + 32 = 45$$

Subtraction using Base 10—including exchanging and regrouping

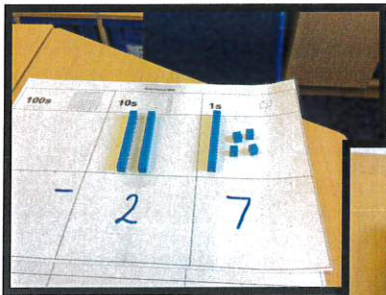


34

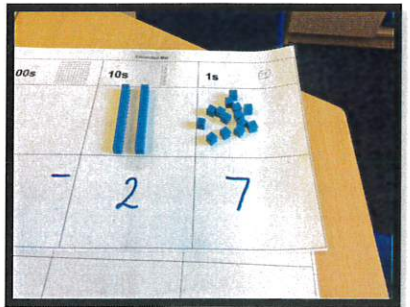
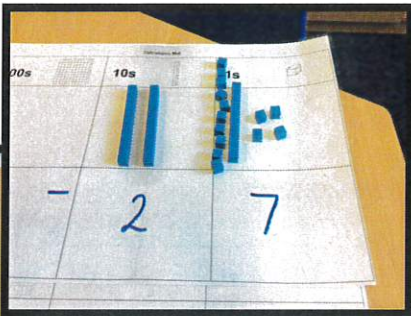
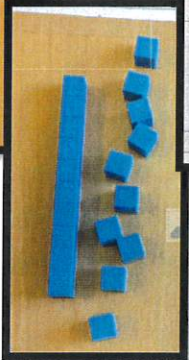
-27

34-27 =

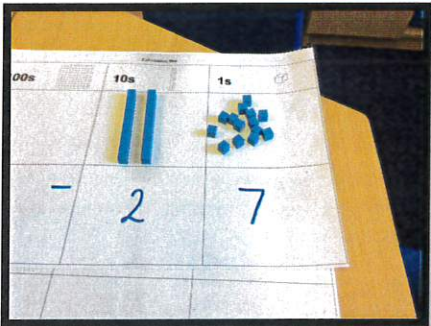
Look at the calculation.
4 ones minus 7 units we can't do so we need to exchange and regroup:
Move one ten from the tens column to the ones



Move one ten from the tens column to the ones column



Exchange and regroup:
Change the ten rod into ten ones



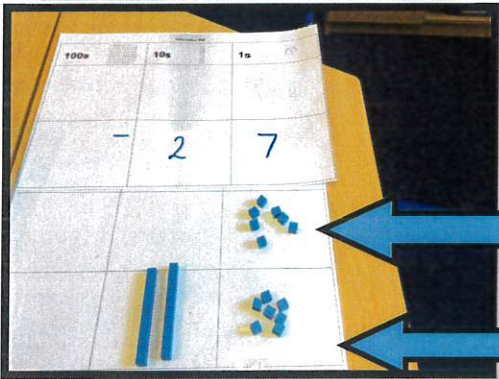
Once you have exchanged and regrouped you can then do the subtraction
(14 ones subtract 7 ones)

Once you have done the subtraction you can move the remaining ones down to show the answer.

2314

- 27

07



Here are the number of ones left when 27 is taken from 43

Here are the 2 tens and 7 ones we have subtracted.

At the same time as doing the Calculation pupils will also learn how to record it as shown above.