Banks Road Infant and Nursery School

"A Home for Learning, Laughing, Caring and Trying"

Mathematics Calculation Policy

June

2023

The Aims of this Policy:

- **To clearly outline the different models and images that can support teaching the four operations of addition, subtraction, multiplication and division.**
- **To provide an overview of skills linked to year groups to support consistency across school.**
- **To support the understanding of key language used to teach the four operations.**

Intent

As Mathematicians our children will develop **fluency in the fundamentals** of Mathematics so they can **enjoy problem solving and reasoning Mathematically** with confidence and curiosity. Our staff deliver highly engaging Maths lessons that promote an enjoyment of Mathematics and nurture a confidence in children to 'have a go'. Our children become **inquisitive**, **resilient Mathematicians** that can apply their skills in a range of contexts and **make connections between Mathematics and the world around them.** We develop children's ability to **articulate, discuss and explain** their thinking using mathematical vocabulary. We enable children to develop **Mastery in Maths**, whilst ensuring all children achieve the appropriate age-related expectations.

Implementation

EYFS

Mathematics provision in EYFS is developed through **purposeful, play based** experiences and will be evident in the indoor and outdoor provision. Provision is **engaging and age appropriate** and designed with the children's interests at heart. Teachers plan from the New Early Years Curriculum with a key focus on **"Number"** and **"Numerical Pattern"** using material from White Rose Maths, Numberblocks and NCETM Mastering Number**.** Maths is taught in daily whole class sessions called "Maths Dollop's". Children who are identified as needing support are then taught one to one or in small groups by the class teacher.

KS1

We use the **White Rose Maths Scheme** to inform our planning and teaching of a **Mastery Mathematics** curriculum. We have invested in high quality **CPD from the MathsHub** to ensure our teaching staff are confident to plan and teach Mastery Mathematics lessons. Teachers can make **carefully considered adaptions** to meet the needs of their class while remaining consistent in their approach. They plan for clear progression of knowledge and skills using the **small steps, lesson plans, PowerPoints and Worksheets** from White Rose. Staff have a good understanding of the **5 Big Ideas in Teaching for Mastery** which informs their decisions around planning and teaching.

Coherence	Representation & Structure	Mathematical Thinking	Fluency	Variation
Lessons are broken down into small connected steps that gradually unfold the concept, providing access for all children that enables them to apply the concept in a range of contexts.	Representations used in lessons expose the mathematical relationships and structure being taught.	Ideas are worked on by the children: thought about, reasoned and discussed with talking partners.	We promote quick and efficient recall of facts and procedures and the flexibility to move between different contexts & representations.	We aim to represent the concept being taught in more than one way. We encourage children to pay attention to what is kept the same and what changes.

We use 'Ready (Red), Steady (Amber), Go (Green) challenges on our adapted worksheets to challenge **all** children and to support the concrete, pictorial, abstract process. We use 'Blue' challenges to challenge children at 'Mastery with Greater Depth'.

Mastering Number is used as a whole class intervention of 15 minutes daily additional Fluency practice in KS1. It is used by Reception teachers to inform planning and ensure consistency from EYFS to Year 1.

Flash Back 4 is used to revisit learning from the previous lesson, the previous week and the previous unit- sticky knowledge.

The concrete, pictorial, abstract approach is central to our planning and teaching with **carefully selected manipulatives and representations** (in line with our scheme and calculation policy) being chosen to deepen understanding.

Impact

- Fluency in their recall of key number facts and procedures
- Accuracy in the formal calculation methods for all four operations
- The flexibility and fluidity to move between different contexts and representations of mathematics.
- The ability to recognise relationships and make connections in mathematics
- The confidence and resilience to reason mathematically and solve a range of problems.
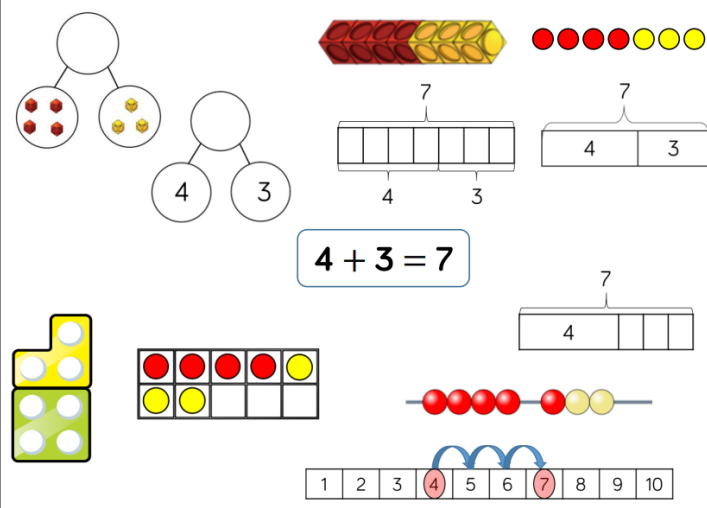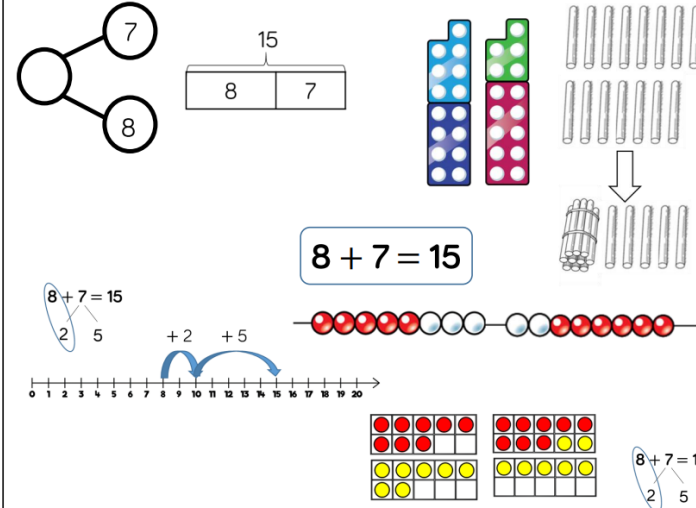
Assessment

1) Informal, formative assessments are made continually by questioning the children, observing and monitoring their work. These short-term assessments are closely related to the learning objectives for the lesson and help inform next steps.
2) We use White Rose Maths end of Unit assessments to check progress and understanding of content covered. These are stuck in the back of Maths books.
3) Sticky Knowledge assessments daily
4) Statutory Assessment Tests (SATs) are used for children in Year 2.
5) Tracking systems are in place to closely monitor and record children's progress throughout school. These are shared at whole school pupil progress meetings and support our analysis of gaps in learning, those children working at Greater Depth and those children who are at risk of falling behind.
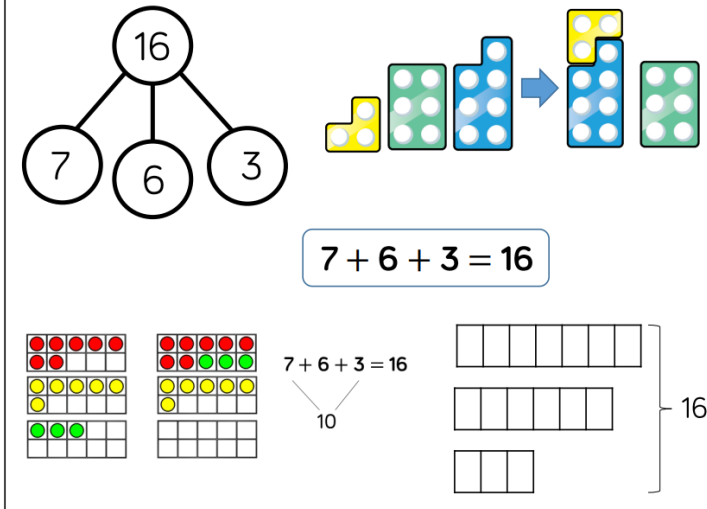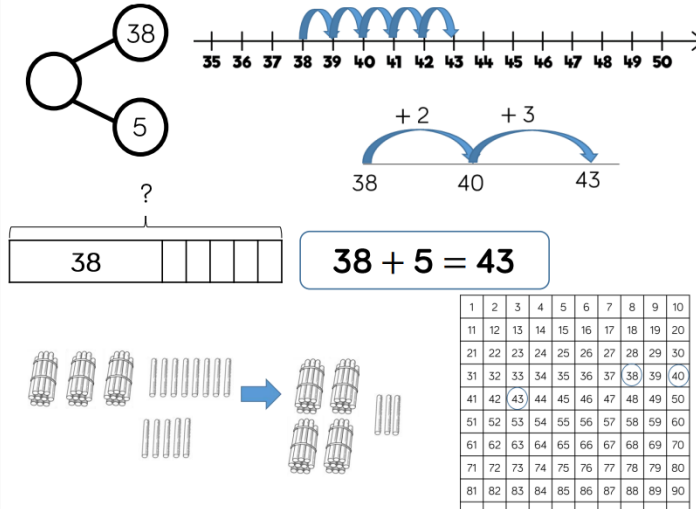
SEND

SEND children work through the same lesson content and worksheets with scaffolding such as, quality first teaching, additional adult targeted support, carefully chosen manipulatives and visual aids (number lines etc.).

Addition

Skill: Add 1-digit numbers within 10	Year: 1

When adding numbers to 10, children can explore both aggregation and augmentation.

The part-whole model, discrete and continuous bar model, number shapes and ten frame support aggregation.

The combination bar model, ten frame, bead string and number track all support augmentation.

$$4 + 3 = 7$$

Skill: Add 1 and 2-digit numbers to 20	Year: 1/2

When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.

Different manipulatives can be used to represent this exchange. Use concrete resources alongside number lines to support children in understanding how to partition their jumps.

$$8 + 7 = 15$$

$8 + 7 = 15$

$+2$ $+5$

Skill: Add three 1-digit numbers	Year: 2

When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently.

This supports children in their understanding of commutativity.

Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.

$$7 + 6 + 3 = 16$$

$7 + 6 + 3 = 16$

10

16

Skill: Add 1-digit and 2-digit numbers to 100	Year: 2/3

When adding single digits to a two-digit number, children should be encouraged to count on from the larger number.

They should also apply their knowledge of number bonds to add more efficiently e.g. $8 + 5 = 13$ so $38 + 5 = 43$.

Hundred squares and straws can support children to find the number bond to 10.

$+2$ $+3$

38   40   43

$$38 + 5 = 43$$

Skill: Add two 2-digit numbers to 100	Year: 2/3

+ 2   + 21

38   40   61

$$38 + 23 = 61$$

Tens	Ones

$$\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ \hline \end{array}$$

Tens	Ones

At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.

Children can also use a blank number line to count on to find the total. Encourage them to jump to multiples of 10 to become more efficient.

Glossary

Addend- A number to be added to another

Commutative- numbers can be added in any order

Partitioning- splitting a number into its component parts

Subitise- instantly recognise the number of objects in a small group without needing to count.

Sum- the result of an addition

Total- the sum found by addition

Add

Equals

Subtraction

Skill: Subtract 1-digit numbers within 10	Year: 1

$$7 - 3 = 4$$

First   Then   Now

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Part-whole models, bar models, ten frames and number shapes support partitioning.

Ten frames, number tracks, single bar models and bead strings support reduction.

Cubes and bar models with two bars can support finding the difference.

Skill: Subtract 1 and 2-digit numbers to 20	Year: 1/2

14

6   8

$$14 - 6 = 8$$

14 − 6 = 8

4   2

− 2   − 4

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

14 − 6 = 8

4   2

When subtracting one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.

Children should be encouraged to find the number bond to 10 when partitioning the subtracted number. Ten frames, number shapes and number lines are particularly useful for this.

Skill: Subtract 1 and 2-digit numbers to 100	Year: 2

$$65 - 28 = 37$$

At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.

Children can also use a blank number line to count on to find the difference. Encourage them to jump to multiples of 10 to become more efficient.

Glossary

Difference- the numerical difference between two numbers is found by comparing the quantity in each group

Inverse- the opposite of another operation e.g. subtraction is the inverse of addition

Subtract

Less

Equals- the same as

Multiplication

Skill: Solve 1-step problems using multiplication	Year: 1/2

One bag holds 5 apples.
How many apples do 4 bags hold?

$$5 + 5 + 5 + 5 = 20$$
$$4 \times 5 = 20$$
$$5 \times 4 = 20$$

Children represent multiplication as repeated addition in many different ways.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.

In Year 2, children are introduced to the multiplication symbol.

Glossary

Array- an ordered collection of counters, cubes or other item in rows and columns.

Column, row

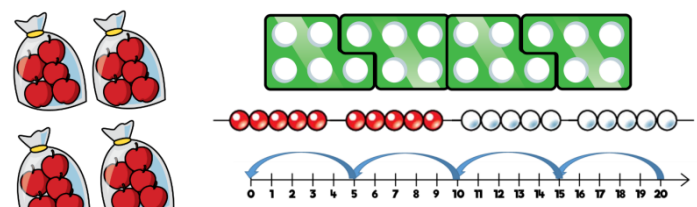**Commutative-** numbers can be multiplied in any order
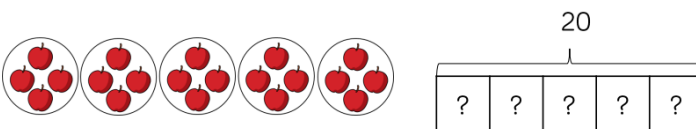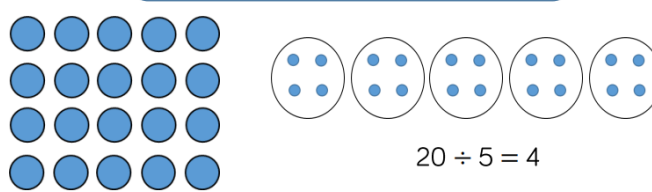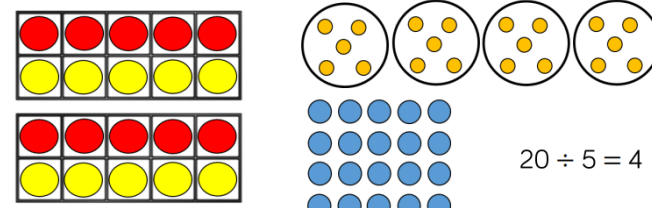
Repeated Addition

Double
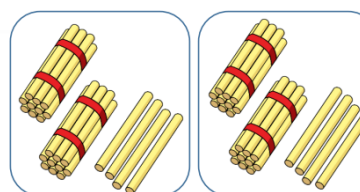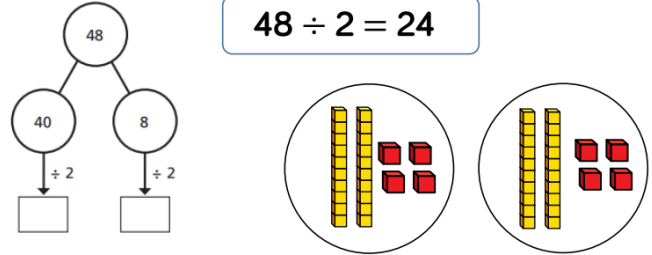
Odd

Even

Division

Skill: Solve 1-step problems using multiplication (sharing) — Year: 1/2

20

| ? | ? | ? | ? | ? |

There are 20 apples altogether.
They are shared equally between 5 bags.
How many apples are in each bag?

$20 \div 5 = 4$

Children solve problems by sharing amounts into equal groups.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally.

In Year 2, children are introduced to the division symbol.

Skill: Solve 1-step problems using division (grouping) — Year: 1/2

There are 20 apples altogether.
They are put in bags of 5.
How many bags are there?

$20 \div 5 = 4$

Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.

Skill: Divide 2-digits by 1-digit (sharing with no exchange) — Year: 1/2

Tens	Ones
10 10	1 1 1 1
10 10	1 1 1 1

48

40   8

÷ 2   ÷ 2

$48 \div 2 = 24$

When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones.

Straws, Base 10 and place value counters can all be used to share numbers into equal groups.

Part-whole models can provide children with a clear written method that matches the concrete representation.

Glossary

Dividend - the number that is to be divided

Divider- the number by which another is divided

Exchange- change a number or expression for another of an equivalent value

Remainder- the amount left over after a division when the divisor is not a factor of the dividend

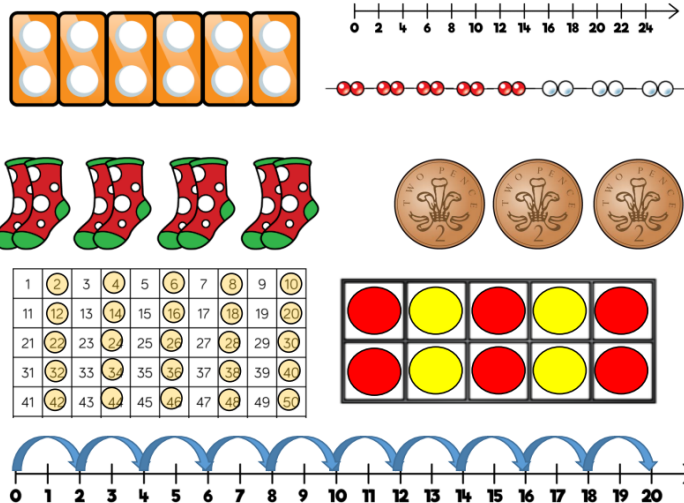**Divide**

Share

Halve

Times Tables

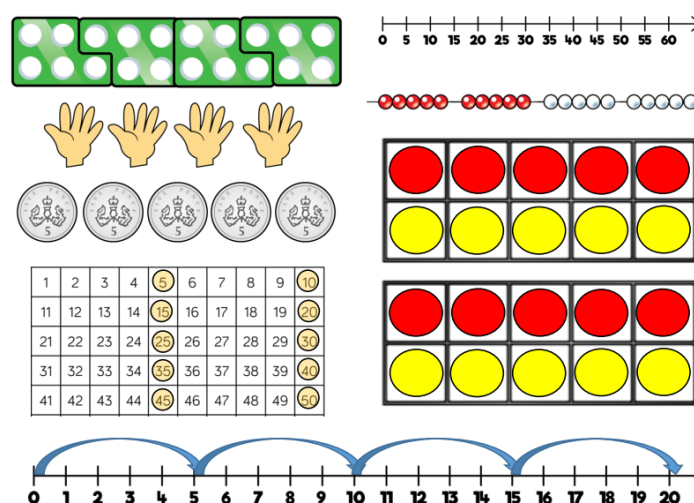| Skill: 2 times table	Year: 2

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the two times table, using concrete manipulatives to support. Notice how all the numbers are even and there is a pattern in the ones.

Use different models to develop fluency.

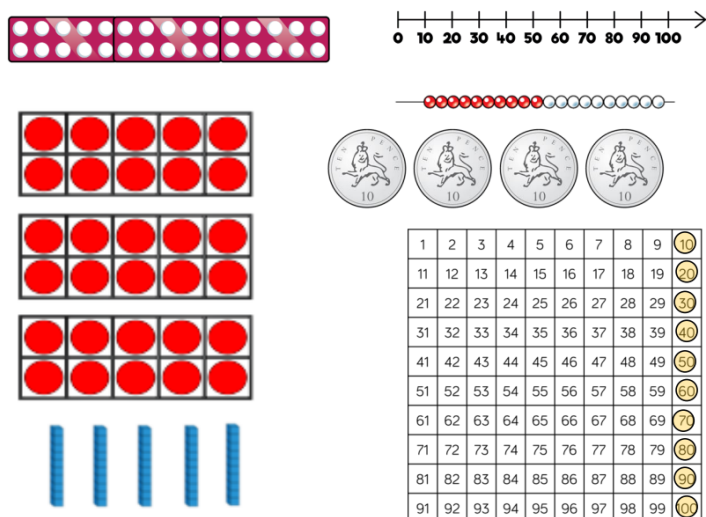| Skill: 5 times table	Year: 2

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the five times table, using concrete manipulatives to support. Notice the pattern in the ones as well as highlighting the odd, even, odd, even pattern.

Skill: 10 times table	Year: 2

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the ten times table, using concrete manipulatives to support. Notice the pattern in the digits- the ones are always 0, and the tens increase by 1 ten each time.