CHAUCER COMMUNITY PRIMARY SCHOOL

Mathematics Policy

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Approved by Governors:	Pending
Review Date:	May 2024
Responsible Person	Kirsty Bell

DOCUMENT PURPOSE

The purpose of this policy is to describe our practice in mathematics and the principles upon which this is based.

AUDIENCE

This document is intended for all teaching staff, school governors, inspection teams and the LA Adviser. Copies are provided for parents on request and are made available by the Headteacher.

INTENT

We understand that our learners come from a wide variety of backgrounds with varying exposure to mathematical concepts and practical experience. As a result, they require robust and clear progression through mathematical concepts and support with learning. The goal of our Maths teaching is to deliver the core aims of the National Curriculum - both in the mathematics lessons and across the curriculum as a whole. Our children will be taught to be confident, successful and proficient mathematicians who can apply their maths knowledge to other contexts and situations. We want our children to leave primary school 'Secondary ready', with excellent foundations for future learning.

These aims are consistent with our school philosophy and take account of the National Curriculum Non-Statutory guidance.

Our vision for Mathematics:

- To promote a positive attitude towards mathematics in all pupils
- To ensure all pupils are engaged in and are enjoying exploring mathematics
- To enable all pupils to find links between mathematics and other areas of the curriculum, including science
- To ensure all pupils progress in mathematics and are challenged appropriately through an in depth understanding
- To use a wide range of concrete, pictorial and abstract representations to develop all pupils' relational understanding of mathematics

- To ensure all pupils are confident using mathematical vocabulary when reasoning about mathematics

- To promote a growth mind set in all pupils, particularly when Problem Solving

IMPLEMENTATION

At Chaucer Primary School, we use White Rose Maths schemes of learning in order to provide a comprehensive and expertly designed journey though the world of Mathematics. White Rose is based on a small steps approach that keeps all learners together. By using the resources across the school, we can ensure consistency of the mathematical elements and comprehensive coverage of the curriculum. We believe that this approach will facilitate consistent delivery of mathematics across the school and across the inevitable ability range within year groups. It is also designed to support mathematicians who require more time and visual representation to grasp fundamental concepts and those who require challenging further to achieve Greater Depth.

White Rose Resources support us to provide:

• CPA (Concrete / Pictorial / Abstract) representations.
• Variation (Procedural / Conceptual).
• Logical and effective small steps.
• Vocabulary.
• Manipulative usage.

White Rose resources support:

• All learners through a whole class learning approach.
• EYFS learning.
• Visual representation designed to show concepts clearly.
• Re-visiting of concepts.
• Bar models and PPW (part part whole) models for problem solving.
• Clear progression of calculation.
• Fluency of calculation and concept with 'Flashback 4' questions

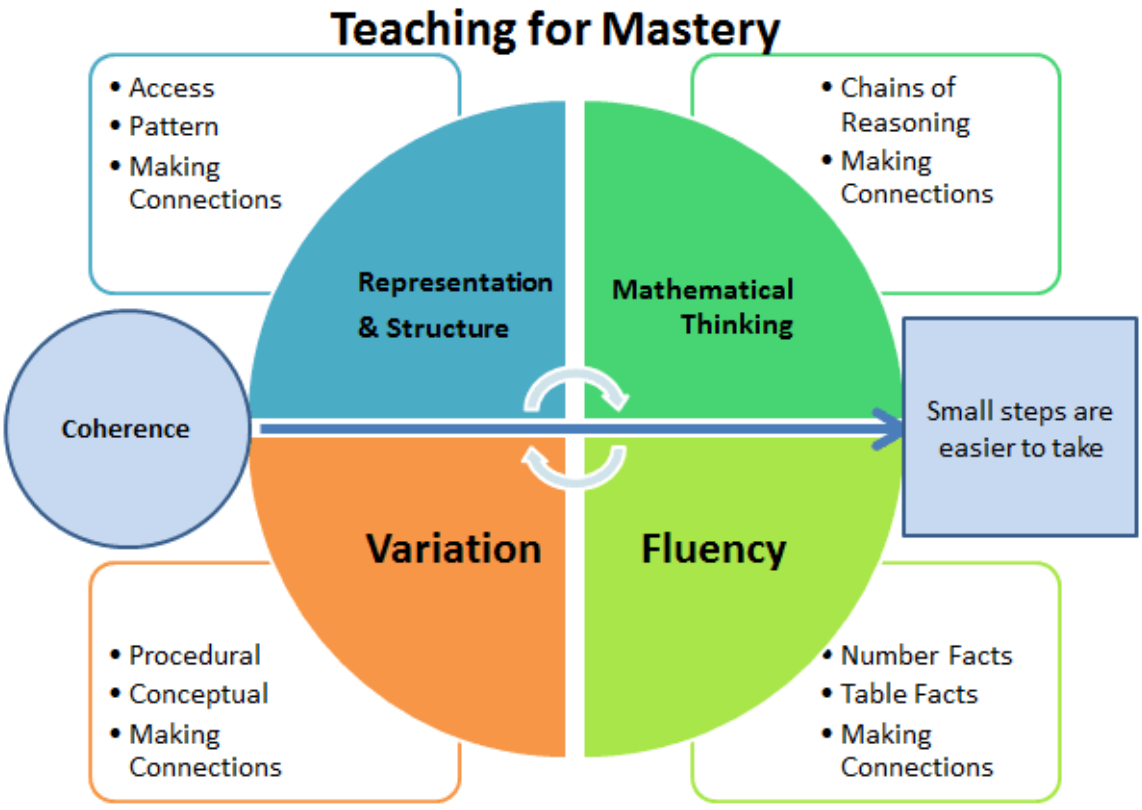
Manipulatives are:
• Used purposefully and appropriately.

• They are available for appropriate lessons – this builds a mental picture of a mathematical concept.

• Manipulative use develops through concepts as the learner moves from EYFS to Y6

White Rose uses the Teaching for Mastery model as illustrated below. This has been developed by the NCETM (National Centre for Excellence in the Teaching of Mathematics)

NCETM Teaching for Mastery



Teaching and Learning - A 'Mastery' Approach

The teaching and learning of mathematics at Chaucer Primary School should include aspects of the following Mastery approach strategies in every lesson and/or over a series of lessons:

'Concrete, pictorial, abstract (CPA) is a highly effective approach to teaching that develops a deep and sustainable understanding of maths.'

CONCRETE

Concrete is the "doing" stage, using concrete objects to model problems. Instead of the traditional method of mathematics teaching, where a teacher demonstrates how to solve a problem, the CPA approach brings concepts to life by allowing pupils to experience and handle physical objects themselves. Every new abstract concept is learned first with a "concrete" or physical experience.

For example, if a problem is about adding up four baskets of fruit, the pupils might first handle actual fruit before progressing to handling counters or cubes which are used to represent the fruit.

PICTORIAL

Pictorial is the "seeing" stage, using representations of the objects to model problems. This stage encourages pupils to make a mental connection between the physical object and abstract levels of understanding by drawing or looking at pictures, circles, diagrams or models which represent the objects in the problem.

Building or drawing a model makes it easier for pupils to grasp concepts they traditionally find more difficult, such as fractions, as it helps them visualise the problem and make it more accessible.

ABSTRACT

Abstract is the "symbolic" stage, where pupils are able to use abstract symbols to model problems.

Only once a child has demonstrated that they have a solid understanding of the "concrete" and "pictorial" representations of the problem, can the teacher introduce the more "abstract" concept, such as mathematical symbols. Pupils are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols, for example +, –, x, / to indicate addition, subtraction, multiplication, or division.

Other elements

Fluency - Number facts

It is critical that children know the number facts in line with their year group and the maths they are learning. Without secure number facts, learners have to spend too much processing time calculating rather than investigating and practising new concepts. Subsequent years build on that experience.

EYFS

EYFS follow the White Rose schemes of learning – principally securing the representations of numbers up to 10 and recognising number to 20. Children are encouraged to spot patterns and identify differences through variation. EYFS practise is predicated on exploration and discovery with songs and repetition to secure foundational knowledge.

Our Early Years children are immersed in mathematics and are given planned and spontaneous opportunities to develop their mathematical understanding. Throughout the physical environment, there are opportunities to practice and embed learning using purposeful and stimulating activities and resources. There is a dedicated maths area in the classroom where children enjoy playing with purposeful resources to enhance what they have been taught. There are also opportunities in other areas of the setting for children to engage in talk about shape, measures, patterns and numbers. Staff model mathematical language and thinking whilst engaging with children in their play.

Songs, stories and rhymes are important in our EYFS setting. Staff pick out numerical patterns in stories and use songs or rhymes to enhance learning of things such as number bonds and composition of numbers. Alongside this, carefully chosen visual representations and manipulatives enable children to make links in their learning about number structures.

We ensure children are given opportunities to explore spatial language, shape and measures. Learning experiences are planned throughout the year for children to explore. Alongside lessons, children have opportunities in the provision, to develop their understanding of patterns, size, shape and spatial relationships, in areas such as construction and craft areas as well as outside.

Mathematics in EYFS does not stop at the end of a maths lesson; staff highlight the mathematics within the daily routines in each setting such as snack times. These routine events enable children to practise their problem solving skills and reasoning skills in real life situations. Children are engaged in mathematical thinking during everyday tasks such as tidying up at the end of a session.

What is Fluency?

Fluency comes from deep knowledge and practice. This is the first stage of pupils' understanding.

Fluency includes: conceptual understanding, accuracy, rapid recall, retention and practice

Accuracy – Pupils carefully completing calculations with no or few careless errors.

Pace – Pupils are able to quickly recall the appropriate strategy to solve the calculation and progress through a number of questions at an age appropriate pace.

Retention – Pupils will be able to retain their knowledge and understanding on a separate occasion to when the concept was first introduced.

The key to fluency is deep knowledge and practice and making connections at the right time for a child.

What is Reasoning?

Verbal reasoning demonstrates that pupils understand the mathematics. *Talk is an integral part of mastery* as it encourages students to reason, justify and explain their thinking. This is tricky for many teachers who are not used to focusing on verbal reasoning in their mathematics lessons. You might, for example, get young learners to voice their thought processes. Older students could take part in class debates, giving them the space to challenge their peers using logical reasoning.

Mathematical Talk

A mastery classroom should never be a quiet classroom. The way pupils speak and write about mathematics transforms their learning. Mastery approaches use a carefully sequenced, structured approach to introduce and reinforce mathematical vocabulary.
To encourage talk in mathematics, teachers may introduce concepts by including sentence structures (stem sentences). Pupils should be able to say not just what the answer is, but how they know it's right. This is key to building mathematical language and reasoning skills. This gives pupils the confidence to communicate their ideas clearly, before writing them down.

Example Stem Sentences:

-The denominator is 5 because the whole has been divided into 5 equal parts.
-The numerator is 3 because 3 equal parts have been shaded/circled.

Teachers then maintain a high expectation upon pupils to repeat and use the correct mathematical vocabulary to explain their understanding verbally and in their reflection

comments. By also displaying the vocabulary during the lesson, pupils will be able to use this independently.

When questioning and encouraging mathematical talk, teachers should provide regular, purposeful opportunities. For example:

- Show me how to complete the calculation
- Teach your friend how to complete the calculation
- How do you know which operation to use?
- Why have you chosen this method?
- How else can you represent this number?
- What have you learnt today?
- True or False
- Odd one out
- Sometimes, always, Never

What is Problem Solving?

Mathematical problem solving is at the heart of the Mastery Approach. Pupils are encouraged to identify, understand and apply relevant mathematical principles and make connections between different ideas. This builds the skills needed to tackle new problems, rather than simply repeating routines without a secure understanding.
Mathematical concepts are explored in a variety of representations and problem-solving contexts to give pupils a richer and deeper learning experience. Pupils combine different concepts to solve complex problems, and apply knowledge to real-life situations. Through problem solving, pupils are required to select their mathematical knowledge and apply this to a new concept.

Problem solving is more than just word problems but the *RUCSAC* approach can be applied to this style of question:

1) Read / look at the problem
2) Understand the problem by underlining or discussing: What is the problem about?
3) hoose – Choose the operation required, the number facts or the approach.
4) Solve – Solve the problem by completing jottings on the page
5) Answer – complete the answer to the problem
6) Check – have I correctly answered the given problem or is there another step?

PLANNING AND ORGANISATION

At Chaucer, Teachers in Reception – Y6 follow the White Rose Planning. This provides the yearly overview and Medium Term planning for each year group.
The yearly overview provides a Long Term Plan and is arranged into 'Blocks'

Year 3 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number – Place Value			Number – Addition and Subtraction					Number – Multiplication and Division			Consolidation
Spring	Number - Multiplication and Division			Measurement: Money	Statistics		Measurement: length and perimeter			Number - Fractions		Consolidation
Summer	Number – fractions			Measurement: Time			Geometry – Properties of Shapes		Measurement: Mass and Capacity			Consolidation

Each term, the Learning Objectives are listed and are time related to ensure coverage and pace.

Year 3 – Spring Term

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Number – multiplication and division Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables. Write and calculate mathematical statements for multiplication and division using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which *n* objects are connected to *m* objectives.			Measurement – money Add and subtract amounts of money to give change, using both £ and p in practical contexts.	Statistics Interpret and present data using bar charts, pictograms and tables. Solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.		Measurement – length and perimeter Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml). Measure the perimeter of simple 2D shapes.			Number – fractions Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators. Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators. Solve problems that involve all of the above.		Consolidation

Each 'Block' then has its own folder of planning for each year group.

Within the planning documents, there are notes and guidance, Mathematical Talk (including Stem Sentences) and examples of how to show Varied Fluency, Reasoning and Problem Solving.

Year 3 | Spring Term | Teaching Guidance

Week 1 to 3 – Number: Multiplication & Division

Comparing Statements

Notes and Guidance

Children use their knowledge of multiplication and division facts to compare statements using inequality symbols.

It is important that children are exposed to a variety of representations of multiplication and division, including arrays and repeated addition.

Mathematical Talk

What other number sentences does the array show?

If you know 4 ×, how can you use this to work out your 8 ×?

What's the same and what's different about 8 × 3 and 7 × 4?

Varied Fluency

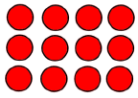
1 Use the array to complete the number sentences:

3 × 4 = ☐

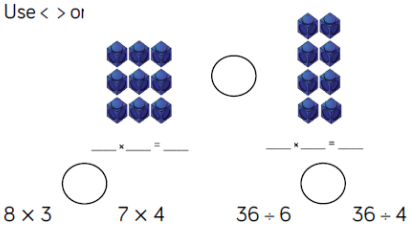
4 × 3 = ☐

☐ ÷ 3 = ☐

☐ ÷ 4 = ☐



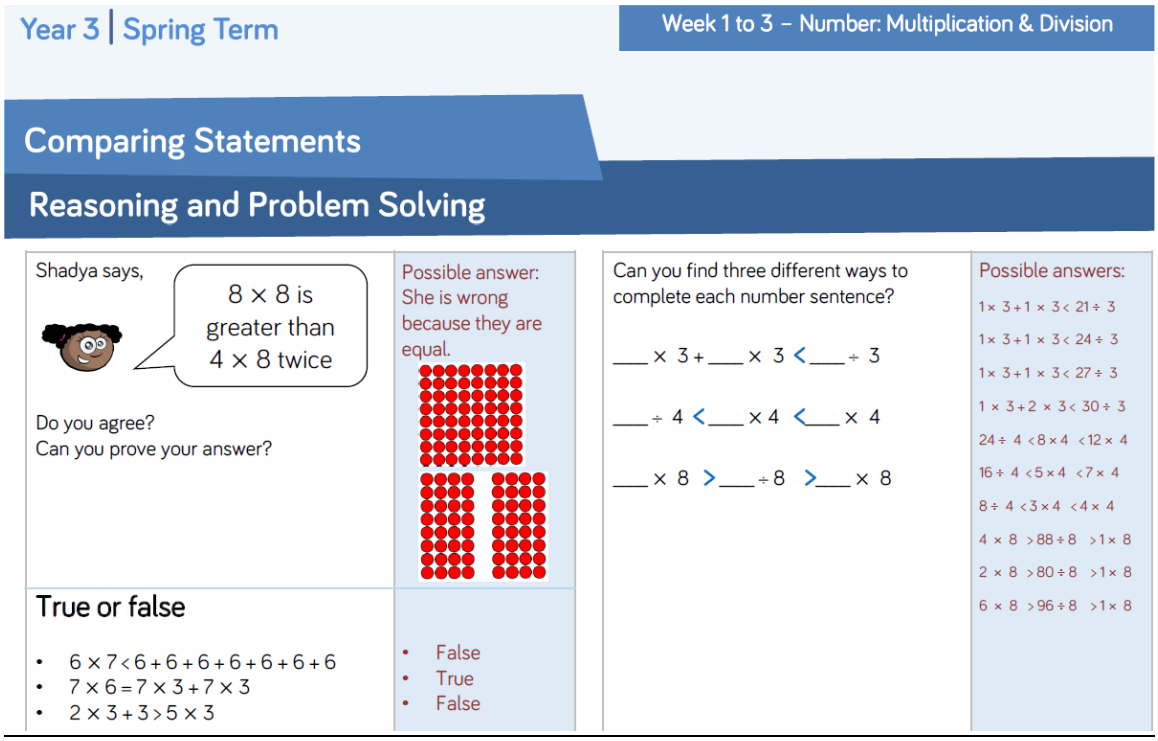
2 Use < > or



8 × 3 7 × 4 36 ÷ 6 36 ÷ 4

3 Complete the number sentences:

5 × 1 < _____ × _____ 4 × 3 = _____ ÷ 3



Year 3 | Spring Term

Week 1 to 3 – Number: Multiplication & Division

Comparing Statements

Reasoning and Problem Solving

Shadya says,

8 × 8 is greater than 4 × 8 twice

Do you agree?
Can you prove your answer?

Possible answer:
She is wrong because they are equal.

True or false

- 6 × 7 < 6 + 6 + 6 + 6 + 6 + 6 + 6
- 7 × 6 = 7 × 3 + 7 × 3
- 2 × 3 + 3 > 5 × 3

- False
- True
- False

Can you find three different ways to complete each number sentence?

___ × 3 + ___ × 3 < ___ ÷ 3

___ ÷ 4 < ___ × 4 < ___ × 4

___ × 8 > ___ ÷ 8 > ___ × 8

Possible answers:

1 × 3 + 1 × 3 < 21 ÷ 3
1 × 3 + 1 × 3 < 24 ÷ 3
1 × 3 + 1 × 3 < 27 ÷ 3
1 × 3 + 2 × 3 < 30 ÷ 3
24 ÷ 4 < 8 × 4 < 12 × 4
16 ÷ 4 < 5 × 4 < 7 × 4
8 ÷ 4 < 3 × 4 < 4 × 4
4 × 8 > 88 ÷ 8 > 1 × 8
2 × 8 > 80 ÷ 8 > 1 × 8
6 × 8 > 96 ÷ 8 > 1 × 8

IMPACT

Children perform well in mathematics. The children demonstrate a quick recall of facts and procedures. This includes the recollection of the times table, which enables them to become confident, fluent mathematicians. They develop the ability to recognise relationships and make connections in maths lessons. Mathematical concepts or skills are mastered when a child can show it in multiple ways, using the mathematical language to explain their ideas, and can independently apply the concept to new problems in unfamiliar situations. Children show a high level of pride in the presentation and understanding of the work they do.

EQUAL OPPORTUNITIES & CROSS CURRICULAR ISSUES

The school's policy for equal opportunities sets out the framework within which equal opportunities in mathematics will occur.

In the daily maths lesson, we support children with English as an additional language in a variety of ways e.g. repeating instructions, speaking clearly, emphasizing key words, using picture cues, playing mathematical games, encouraging children to join in counting, chanting, rhymes etc.

We make every effort to incorporate mathematics into a wide range of cross curricular subjects, and seek to take advantage of multi-cultural aspects of mathematics.

This helps to expand and consolidate mathematical concepts and using maths in a purposeful way in everyday contexts helps the children to realise that mathematics is important in the real world.

- Geography: map work, co-ordinates
- History: timelines, sequencing
- Art: symmetry, proportion, measurement, cultural patterns
- Music: repeating patterns, counting
- Science: sorting, reading scales, measuring, interpreting results and graphs
- English: sequencing, talking, questioning
- PE: directional movement
- DT: shape, modelling, measuring
- ICT: spreadsheets, databases, data logging
- RE: multicultural patterns, symbols, awe and wonder

SUBJECT LEADER ROLE

The Maths Subject Leader will endeavor to:

- Ensure understanding of the requirements of the National Curriculum for mathematics.
- Keep up to date with developments in the teaching of mathematics.
- Teach demonstration when required.
- Observe colleagues and monitor plans and quality of teaching in own classroom.
- Prepare policy documents and schemes of works as necessary.
- Advise colleagues, help develop expertise and monitor the teaching of Mathematics throughout the school
- Encourage the development of valid Mathematical activities that are appropriate, differentiated and enable progression
- Liaise with FS, KS1 and KS2 staff, headteacher, governors, parents and advisers as necessary.
- Use maths budget to buy appropriate resources and equipment
- Collect and maintain resources and ensure accessibility
- Contribute to the in-service training of staff

THE GOVERNING BODY

The Maths Governor meets regularly with the Maths Subject Leader to discuss issues arising and updates within the teaching and learning of mathematics within the school. The Maths Governor reports back to the curriculum committee on a regular basis.

RESOURCES

Resources are stored centrally and in individual rooms. Staff are made aware of these arrangements and any further acquisitions.

INSET PROVISION

This is in line with school policy.

CROSS PHASE / SCHOOL TRANSFER

Teachers will have opportunities to liaise with previous / next class teacher and colleagues from transfer school(s).

Meetings will be as required and prior to transfer.

The purpose of meetings will be to transfer documentation, transfer details of individual pupil's progress and needs and facilitate curriculum development and continuity.

Documents should be transferred to class teacher by end of year and to new schools in line with national policy.