# Grange Primary School

# Maths Policy

# September 2021

*Belong*    *Believe*    *Achieve*

At Grange we encourage our pupils to become lifelong learners. We want to give children an education of the highest standard, we aim for excellence in all our school activities and encourage all pupils, whatever their ability to achieve the best they possibly can. We believe that providing pupils with a well-balanced, enriching and engaging Maths Curriculum will aid them in developing into self-assured mathematicians. This policy outlines our intent and approach to teaching maths to ensure consistency throughout the school.

## 1. Maths Curriculum Intent

At Grange we see maths as a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

## 2. Maths Curriculum Implementation

At Grange, Our curriculum focuses on the 3 aims of the national curriculum: Fluency, Reasoning and Problem Solving.

• Fluency – Children will become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

• Reasoning – Children will reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language

• Problem Solving – Children will solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

We are committed to a mastery approach to the teaching maths at Grange. At the heart of our approach is the NCETM's 5 big ideas for mastery as illustrated in the diagram below.
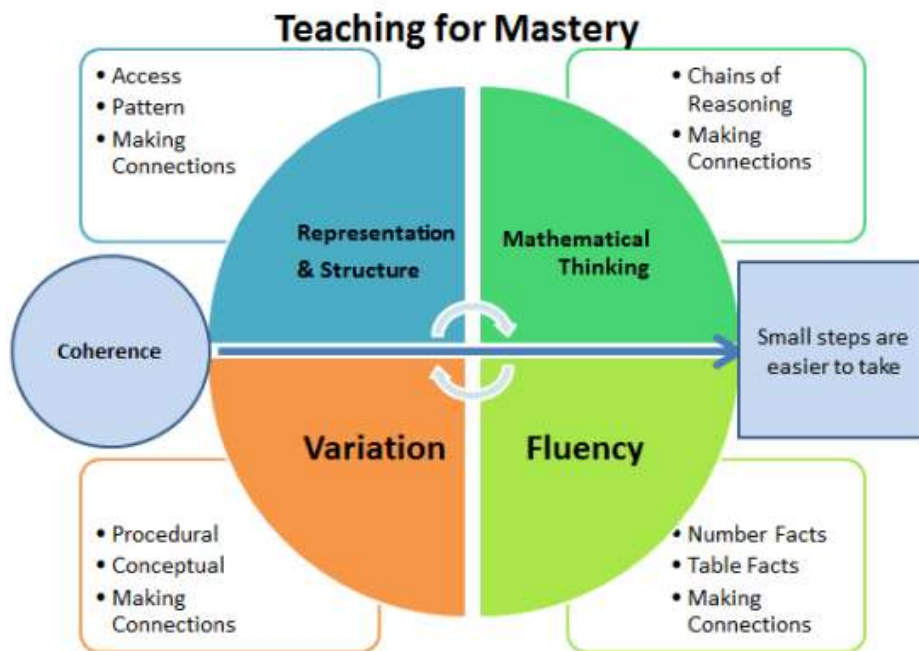
This diagram helps us to see how the 5 big ideas work together. It is important to understand that the National Curriculum aims of fluency, reasoning and problem solving are not discrete skills to be taught separately. At Grange, we design lessons with these 5 big ideas in mind so that children will apply their fluency, reasoning and problem solving skills in all lessons.

We are committed to a mixed ability approach to our maths teaching at Grange. Children are not streamed by ability and activities are not differentiated by ability. The expectation of the National Curriculum is for all children to move through the curriculum at 'broadly the same pace.' In classrooms we encourage teachers to set seating plans so that children are in mixed ability pairings and all children are exposed to a good level of mathematical thinking.

We recognise that some children will need support to access the maths curriculum and some children will need to be challenged so that they maintain their interest in the subject. We encourage the use of manipulatives to help children better understand the structures that underpin mathematics. A CPA (Concrete, Pictorial, Abstract) approach should not be confined to Early Years and Key Stage one. Children across the school, of all abilities, can benefit from purposeful use of manipulatives and visual representations to help develop a deep understanding of maths. Manipulatives such as dienes, Numicon, Cuisenaire, double sided counters are available for all children to be used and high quality visual representations of these manipulatives can be created at these websites and used in lesson design.

https://mathsbot.com/#Manipulatives
https://www.mathlearningcenter.org/resources/apps

Challenge questions are an integral part of all maths lessons at Grange and rather than accelerating children on to new content, the aim of our challenge questions is to enable children to go deeper with their understanding and make connections with other areas of maths.

## 3. Lesson Design

At Grange we have developed a consistent approach to lesson design to ensure coherent progression through curriculum objectives. The progression through the National Curriculum objectives is broken down into units. Teachers follow the units in the yearly overviews in the White Rose maths plans (see below)

# Year 1 – 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 (within 10) | | | | Number: Addition and Subtraction (within 10) | | | | Geometry: Shape | Number: Place Value (within 20) | | Consolidation |
| **Spring** | Number: Addition and Subtraction (within 20) | | | | Number: Place Value (within 50) (Multiples of 2, 5 and 10 to be included) | | | Measurement: Length and Height | | Measurement: Weight and Volume | | Consolidation |
| **Summer** | Number: Multiplication and Division (Reinforce multiples of 2, 5 and 10 to be included) | | | Number: Fractions | | Geometry: position and direction | Number: Place Value (within 100) | | Measurement: money | Time | | Consolidation |

# Year 2 – 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 | | | | | Measurement: Money | | Number: Multiplication and Division | |
| **Spring** | Number: Multiplication and Division | | Statistics | | Geometry: Properties of Shape | | | Number: Fractions | | | Measurement length and height | Consolidation |
| **Summer** | Position and direction | | | Problem solving and efficient methods | Measurement: Time | | Measurement: Mass, Capacity and Temperature | | | Investigations | | |

# 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 |

# Year 4 – 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 | | | Measurement - Length and Perimeter | Number- Multiplication and Division | | | Consolidation |
| **Spring** | Number- Multiplication and Division | | | Measurement - Area | Fractions | | | | Decimals | | | Consolidation |
| **Summer** | Decimals | | Measurement- Money | | Time | Statistics | | Geometry- Properties of Shape | | | Geometry- Position and Direction | Consolidation |

## Year 5 – 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 | | Statistics | | Number – Multiplication and Division | | Perimeter and Area | | Consolidation |
| **Spring** | Number – Multiplication and Division | | Number – Fractions | | | | | | | Number – Decimals & Percentages | | Consolidation |
| **Summer** | Number – Decimals | | | | Geometry- Properties of Shapes | | | Geometry- Position and Direction | Measurement- Converting Units | | Measures Volume | Consolidation |

## Year 6 – 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, Subtraction, Multiplication and Division | | | | Fractions | | | | Geometry- Position and Direction | Consolidation |
| **Spring** | Number- Decimals | | Number- Percentages | | Number- Algebra | | Measurement Converting units | Measurement Perimeter, Area and Volume | | Number- Ratio | | Consolidation |
| **Summer** | Geometry- Properties of Shapes | | Problem solving | | | Statistics | | Investigations | | | | Consolidation |

Each unit is broken down into small steps (see example below)

# Overview
## Small Steps

### NC Objectives

- Count objects to 100 and read and write numbers in numerals and words
- Represent numbers to 100
- Tens and ones with a part whole model
- Tens and ones using addition
- Use a place value chart
- Compare objects
- Compare numbers
- Order objects and numbers
- Count in 2s, 5s and 10s
- Count in 3s

Read and write numbers to at least 100 in numerals and in words.

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.

Use place value and number facts to solve problems.

Count in steps of 2, 3 and 5 from 0, and in tens from any number, forward and backward.

Teachers are advised that small steps suggested by White Rose are not set in stone. If teachers feel a different order through the small steps would benefit their children then they are encouraged to make alterations. Each step does not automatically equate to one lesson. In our experience some of the steps might take 2 or 3 lessons to ensure that the skills are embedded. Teachers should use their discretion when planning and adapt according to the needs of their class. When designing a lesson, teachers are encouraged to plan the independent tasks first then design the teaching slides to lead into the tasks. This is to ensure a coherent progression through the lesson. Independent tasks are broken down into 2 or 3 tasks.

Three task approach - Where three tasks are used, teachers plan three tasks with a challenge question to accompany them. The lesson is split between input from the teacher/paired discussion and time for the children to complete the three tasks. We take a 'low threshold, high ceiling' approach to task design to ensure they are accessible to all.

Due to the increasing complexity as you move through the tasks, all children would not necessarily be expected to complete all tasks. All children will start from task 1. Some will be challenged at this level while others will move quickly through the tasks before reaching a level that challenges them (task 2, task 3 or challenge). With this in mind, teachers should be planning tasks so that they do not exceed 4 or 5 questions.

LQ: Can I show percentages as fractions and decimals?

△ I can use a hundred square to show parts of one hundred.

□ I can use a place value chart to show hundredths.

○ I can represent a fraction out of one hundred.

## Fluency

1.
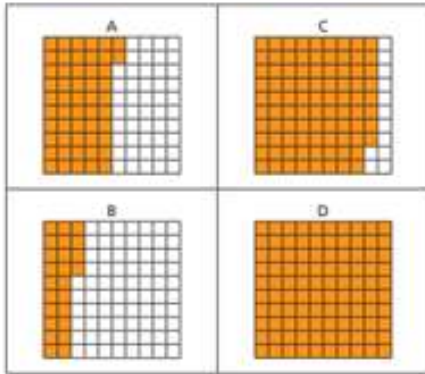


Complete the table.

| Hundred square | Percentage | Fraction | Decimal |
|---|---|---|---|
| A | | $\frac{52}{100}$ | |
| B | | | |
| C | | | |
| D | | | |

2.

a) $32\% = \frac{\Box}{100} = \boxed{\phantom{x}}$

$35\% = \frac{\Box}{100} = \boxed{\phantom{x}}$

$48\% = \frac{\Box}{100} = \boxed{\phantom{x}}$

b) $\frac{17}{100} = \boxed{\phantom{x}}$ $\% = \boxed{\phantom{x}}$

$\frac{9}{100} = \boxed{\phantom{x}}$ $\% = \boxed{\phantom{x}}$

$\frac{90}{100} = \boxed{\phantom{x}}$ $\% = \boxed{\phantom{x}}$

c) $0.29 = \boxed{\phantom{x}}$ $\% = \frac{\Box}{100}$

$0.71 = \boxed{\phantom{x}}$ $\% = \frac{\Box}{100}$

$0.03 = \boxed{\phantom{x}}$ $\% = \frac{\Box}{100}$

## Further fluency

Write the values in order from smallest to greatest.

a) 33%   $\frac{30}{100}$   3%   $\frac{13}{100}$

b) 299%   $\frac{91}{100}$   9%   $\frac{9}{10}$

c) 2.5   $\frac{25}{100}$   250   25% of 100   $\frac{25}{1000}$

## Reasoning

1.

Write <, > or = to complete the statements.

a) 50% ◯ $\frac{5}{100}$

b) 25% ◯ $\frac{50}{100}$

c) 14% ◯ $\frac{41}{100}$

d) $\frac{40}{100}$ ◯ 40%

e) $\frac{70}{100}$ ◯ 7%

f) 82% ◯ $\frac{82}{100}$

2.

Prove that 0.2 is equal to 20%.

You may use a hundred square to help you.

Why do you think some people think that 0.2 is equal to 2%?

## Challenge

Jack and Dora go shopping with the same amount of money.

Jack spends $\frac{1}{3}$ of his money.

Dora spends 30% of her money.

a) Who spends more money?

Use fraction and percentage equivalence to explain your answer.

b) Jack and Dora each started with £300

How much money do they each have left?

How to plan tasks?

Teachers have access to the White Rose plans to help them with ideas for tasks. Although White Rose has suggested activities for Fluency, Reasoning and Problem Solving, these should not be seen as the three tasks for use in lesson design. These activities are not necessarily designed to complement one another and simply using all 3 as your tasks will lead to a lack of coherence in lessons and greater confusion for children. Teachers are encouraged to consider the suggested activities. Perhaps one of the activities could be used as one of the tasks with the teacher then planning other tasks which will complement this and develop children's understanding in a clear coherent way. Teachers are encouraged to develop their own tasks. Suggested question roots for reasoning questions can be found below.

Use these question roots in class to help deepen children's understanding.

1) **True or False** e.g. all multiples of 3 are odd numbers, true or false. Why?
2) **Spot the Mistake** e.g. 1, 3, 5, 8, 9. Where is the mistake? Can you correct the mistake?
3) **Always, Sometimes, Never** e.g. Is it always sometimes or never true that the difference between two odd numbers is odd?
4) **Possible Answers** e.g. A number added to 5 equals a prime number. What could the number be?
5) **Convince Me** e.g. Convince me that a square is not a triangle.
6) **Hard and Easy Questions** e.g. Which questions are hard/easy? $323 + 10 =$, $393 + 10 =$, $284 + 10 =$ Explain why you think they are hard.
7) **Making links** e.g. $7 \times 8 = 56$. How can you use this fact to solve these calculations – $0.7 \times 0.8 =$, $5.6 \div 8 =$

Planning teaching slides

Teaching slides should be planned carefully to complement the tasks so that they are relevant. Images and representations used in teaching slides should be of the same style as those used in tasks so children are not unnecessarily confused. High quality visuals to use in tasks and teaching slides can be found at the following websites:

Mathsbot.com - https://mathsbot.com/#Manipulatives
Math Learning Center - https://www.mathlearningcenter.org/resources/apps

## 4. Times tables and fluency

At Grange, we recognise the importance of fast and accurate recall of times tables facts. With this in mind, all year groups from years 2 – 6 will be practicing times tables using Maths Frame. There is an expectation that by the end of year 4, children will know their multiplication and division facts for the tables up to 12 x 12.

## 5. Impact / Assessments

All assessments made in Maths are in line with either the Development Matters statements within the Statutory Guidance for the Early Years Foundation Stage or National Standard statements for maths found in the National Curriculum. ARE Folders and the exemplars within each are used to make consistent and robust assessments. Tracking of Maths is completed on the Whole School Tracking Documents by each class teacher, three times a year. Within this tracking system, NTS test scores for Maths are recorded. This data is analysed as part of the regular Pupil Progress Meetings that are held and actions are put in place for individual children. Summative assessment is made in an ongoing manner on a daily basis by the class teacher. NTS papers are sat at the end of the year by children in Years 3 – 5. Statutory Assessment Tests in Year 2 and 6 provide data that enables the impact of the maths curriculum to be evaluated. Year 2 attend external moderation within Southwark and all year groups moderate across phases, along with the Maths Lead. The Lead

Teacher also attends moderation with Cluster Schools. The impact is measured both in attainment and attitudes towards Maths. Data is scrutinised and actions put in place to ensure maximum progress for every child.

## 6. Accountability and Subject Leadership

The Maths Lead Teacher is responsible for monitoring planning on a termly basis. Teachers will receive feedback and support where necessary to develop their practice. The Maths Lead Teacher is responsible for developing and championing their subject and should be approachable as a source of support for planning and teaching. Lead teachers will be responsible for modelling teaching across year groups, team teaching with teachers in their own year groups, and monitoring teachers' practice. Book looks will also be carried out to ensure progress is being made and targeted interventions put in place. Discussions will be had throughout the year with the Curriculum Leader.