Grange Primary School
Mathematics Policy

Ethos

Mathematics is a powerful, universal language used to explain, predict and represent events as well as tackle everyday problems. It is of central importance to our modern society and an essential part of everyone's daily life: critical to science, technology, finance and engineering. Mathematics is necessary for any employment or independent life.

We at Grange are committed to ensuring that our pupils develop mastery in mathematics. By the term 'mastery' we mean that each pupil will gain a deep and secure knowledge and understanding of maths at each stage in their learning so that by the end of every school year or key stage, pupils will have acquired mastery of mathematical facts and concepts that they have been exposed to. We aim not only to prepare our pupils for the next stage of their education, but also to lay the foundations for successful lives after school. Our aim is to prepare our pupils for the jobs of tomorrow, which requires our pupils to acquire a deep, long-term, secure and adaptable understanding of the subject in order to move confidently and securely to more advanced material. The aims of our maths teaching at Grange Primary School are aligned with the aims of the National Curriculum: **fluency, reasoning** and **problem solving** – both in the mathematics lesson as well as across the curriculum. We recognise that pupils need to learn basic number facts and acquire **fluency in procedures**, alongside **developing conceptual understanding** if they are to be able to solve increasingly complex problems in later in life.

We aim to achieve this using a variety of strategies:

- use of concrete objects to act out an idea or skill;
- visual, pictorial representations such as bar models to represent problems; and
- link visual representation to abstract representation – to foster full conceptual understanding of formal methods.

Lessons are planned to nurture a Growth Mind-set where pupils are encouraged to demonstrate resilience and reflect on what they are learning as well as the mathematical complexity using the language of Solo Taxonomy.

Teachers aim for pupils to:

- be enthusiastic learners;
- enjoy excelling in maths;
- name and explain where they are in their learning; and
- believe that success is defined by hard work and determination.

Key Principles

Key stage 1 – years 1 and 2

The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should

involve working with numerals, words and the 4 operations, including with practical resources [for example, concrete objects and measuring tools].

<u>Lower key stage 2 – years 3 and 4</u>
The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

<u>Upper key stage 2 – years 5 and 6</u>

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

(Taken from the National Curriculum Mathematics programme of study, July 2014)

Learning for All

We believe that all pupils are able to learn and achieve mastery of a concept with time and dedication. We aim to provide a rich mathematical education, which will develop the potential of all pupils including those with special educational needs and disabilities (SEND). We seek to ensure that all barriers to learning are removed to enable pupils with SEND to be offered full access to a broad, balanced and relevant education. This may include aspects such as adapting the curriculum as well as extended practical experiences using concrete resources. For further details about how we support pupils with SEND, please refer to the SEND policy.

Lessons are personalised through varied questions∗ and the use of different scaffolds to develop a depth of understanding. The level of complexity within the task creates the opportunity to teach the same concepts and skills simultaneously to pupils of different abilities.

<u>Scaffolds include:</u>
- Peer support
- Concrete materials
- Pictures
- Varied questions*
- Moderate pace to identify patterns and connections
- Level of adult support

The example below provides five tasks with the same theme and content, with differentiated challenge.

1) Find the mean of the following set of numbers: 2, 3, 6, 7, 8, 9
2) Create a data set with a mean of 6.
3) These numbers have a mean of 6: 3, 4, 6, 6, 8, 9. Change two numbers so that mean stays the same.

4) *2, 5, 5, 7, 9, and X have a mean of 6. Find X.*
5) *X, Y and Z have a mean of 6. I now add the number 4 to the data set. What is the new mean?*

Pupils who rapidly and regularly master age related concepts and objectives may be identified by their class teacher as More Able. Planning for these pupils will focus on enrichment and the development of deeper mathematical thinking rather than accelerating the teaching of content.

Assessment for and of Learning

Assessment is an on-going process in the classroom which forms the basis of future action. Formal and informal teacher assessments are based upon the practical, written and oral work produced by the pupils. Formative assessment occurs at various points throughout the lesson. Incorrect answers or approaches are not erased as errors and misconceptions provide a valuable insight to the path a child is taking and provides invaluable informal assessment. Teachers pose precise questions to pupils in order to assess the depth in understanding of the mathematical concepts taught. Lessons are structured to ensure opportunities during the lesson to clarify misconceptions. When assessed as necessary teachers direct teaching assistants to provide immediate intervention in the afternoon Next Steps Intervention sessions. Summative assessment takes place half termly and at the end of the year with regular moderation to secure judgments. In addition, pupils complete summative assessments at the completion of each unit of work, called a Review. The results of these assessments are used formatively to identify those pupils in need of extended practical experiences to ensure mastery.

Implementation

As a school, we believe in quality first teaching. Weekly lesson plans are completed on a standard school pro-forma which is displayed in the classroom and saved in a planning file on the school computer system, along with flipcharts and other resources. All lessons are taught using The Maths – No Problem! Primary Maths Series. The series provides high quality text books and lesson guidance based on the teaching methods developed in Singapore and aligns fully with The Primary National Curriculum for Mathematics 2014.

Lesson Structure *(Times are a guide for the expected pace of lesson)*

Phase – Tweak to Transform	Lesson phase	Maths No Problem	Timing*
Phase 1: The Overview Pupils are engaged without feeling anxious. Lesson is linked to pupils' prior knowledge through formative assessment. Lesson is placed in a wider context - pupils are provided with an overview. Specific learning intentions are shared with pupils. Interest is generated and curiosity stimulated. Open questions are asked.	Enquiry: • Links made to previous learning etc. • Pupils encouraged to have a go at solving the problem	In Focus -	15 mins

Phase 2: Exposition	Teacher modelling	Let's learn – guided working	10 mins
Teacher talk is kept brief and does not exceed pupils' concentration span (talk-do-talk-do). Information is presented in short chunks. Teacher frequently asks (closed) questions to check for (surface) understanding. New information is delivered in a variety of ways, to suit pupils with visual, auditory and kinaesthetic learning preferences. Teacher checks that all pupils understand technical language and subject-specific terms.	• This phase includes working all together • Pupils actively involved in their learning		
Phase 3: Processing	Independent work	Application	30mins
Frequent teacher-pupil and pupil-pupil interactions. Time allowed for pupils to think about and discuss their responses to questions. Opportunities for pupils to generate questions. Tasks that enable the teacher to assess understanding. Pupils given opportunities to process information in their preferred style. An emphasis on pupils recreating rather than reproducing** information	• Pupils provided with the opportunity to work independently • This phase mini plenaries to check understanding		
Phase 4: Review	Reflection	Review	5 mins
Sufficient time is devoted to reviewing/reflecting on what has been learned. Pupils actively engaged in the review process to inform next steps. Explicit reference to learning intentions/success criteria is made. Pupils are encouraged to reflect on how they have learned using the language of SOLO taxonomy. Questions/statements are also provided in order to stimulate thought before the next lesson.	• Are pupils able to reflect on their learning? • Has learning been linked to SOLO?		

Reflections/Journaling

Journaling (also known as reflections) helps pupils stretch their thinking and make sense of problems that they may find confusing or frustrating. Reflections/journals offer an alternative form of assessment: evaluations of progress can be made and lessons can be modified to address needs.

Linked to the language of SOLO Taxonomy, pupils identify the depth of their learning linked to key skills and identify next steps in their learning and/or areas to develop.

Reflections take place either at the final stage in the lesson or after the initial enquiry task (In Focus) if strategies around a particular method, generalisations or reasoning around a conceptual understanding require as such. Teachers use professional judgement to decide, when planning, at which point in the lesson the reflection/journaling process will occur.

Prompts that Assess Attitudes: pupils write about their personal thoughts and feelings about maths prompts may include:

- *When it comes to learning about _____ in maths, I find it difficult to...*

- *I love learning about_____ because…*
- *Today I feel that I am at the _____ stage because I can…*
- *When I study _____, I feel….*
- *A helpful strategy I learned today is…*
- *I am most confident with…*

Prompts That Assess Learning: pupils write about what they've learned and reflect on what they know (and don't know). Examples include the following prompts:

- *The most important thing I learned today is…*
- *I could use today's skill in my real life when I…*
- *What I understand about _____ is…*
- *Today I learned the …. method which…*
- *At the end of this unit, I want to be able to…*
- *To explain _____ to someone who does not know …*

Prompts That Assess Process: pupils explain how to solve problems or discuss a particular skill or strategy. Possible prompts include the following

- *Two ways to solve this problem are…*
- *I knew my answer was right when…*
- *Another strategy I could have used to solve this problem is…*
- *If I missed a step in this problem, I could have…*
- *The mistake is …*
- *The most important part of solving this problem is to remember….*

Footnotes

* Varied questions - variation in questioning is fundamental for differential challenge. It refers to questions progressing from structured questions with scaffolds to open ended questions which require a deeper level of thought and underlying mathematical skills.

**Recreating versus reproducing refers to the ability to give new life and energy rather than produce an image or copy – in essence the goal is to ensure an element of new learning takes place.