Intent, Implementation and Impact Twyning's Mathematics Curriculum

Achieve, Create, Enjoy

'Solving Problems'

Intent

At Twyning School we believe that ***all*** children can *achieve* in deepening their understanding in mathematics across our whole school by demonstrating perseverance, being courageous and having motivated teachers as role-models. We are continuously developing the mindsets of both pupils and staff within mathematics to build resilient, well rounded, motivated and successful mathematicians. Through high quality first teaching and expectations, reactive practice and collaborative learning and support, all of our children at Twyning School are given every opportunity to develop both procedural and declarative knowledge.

Mathematics at Twyning prepares our pupils for their future lives by supporting them to develop key skills through the use of a broad, interactive and high quality maths curriculum that makes links to the real world. We foster positive, 'can-do' attitudes that inspire a high level of *enjoyment* of the subject. Our high quality first teaching ensures that mastery is a focus, showing a secure and deep understanding of mathematical concepts through sequential and manageable steps. All pupils at Twyning School will spend time becoming true masters of content, applying and being *creative* with new knowledge in multiple ways.

We aim for ***all*** our pupils to:

- become fluent in the fundamentals of mathematics so that they develop conceptual understanding and the ability to recall and apply knowledge rapidly, accurately and confidently.
- be able to solve problems by applying their mathematics to a variety of problems with increasing sophistication, including in unfamiliar contexts and to model real-life scenarios.
- reason mathematically by following a line of enquiry to develop and present a justification,argument or proof using mathematical language.
- have an appreciation of number and number operations, which enables mental calculations and written procedures to be performed efficiently, fluently and accurately to be successful in mathematics.

Implementation

'Knowing' and 'understanding' key concepts is not just about being able to answer questions quickly and accurately. Mastering mathematical skills is knowing why and how and being able to select the most appropriate methods to do so. All our children are provided with these examples during our teaching inputs whilst then following a sequence of concrete, pictorial and abstract teaching and questioning, with learning appropriate to the learning need within each classroom. We aim to see our children being able to use their knowledge appropriately across fluency, reasoning and problem solving activities; which are important strands of our teaching of mathematics. Where possible, links are made with other subjects across the curriculum for example: recording data in Science, understanding dates and time in History, area in Geography, ratio of paint mixing in Art.

For any mathematical concept that is taught in our curriculum, children are provided with opportunities to be challenged through being offered 'rich and sophisticated' problems. After the children have developed fluency *(Do it)*, they need to be able to demonstrate that they can apply their knowledge in the form of reasoning *(Secure it)* and be able to move further towards demonstrating that they have mastered *(Deepen it)* the concepts in a range of different ways.

Twyning School defines fluency, reasoning and problem solving to support this mastering approach:

Fluency: *development* of number sense (facts, formulas, concepts and rules) and being able to use the most appropriate method with increasing efficiency - procedural/ declarative knowledge *(Do it)*.

Reasoning: following the process of *applying* logical and critical thinking to a mathematical problem in order to work out the correct or incorrect strategy to use in reaching a solution. This also includes being able to explain how they came to the answer that they have reached. This is an important foundation to problem solving - declarative knowledge/conceptual knowledge *(Secure it)*.

Problem Solving: this is *deepening* understanding through solving unfamiliar questions/problems and having skills and knowledge to do so through the problem solving strategies we teach - conditional knowledge *(Deepen it)*.

Problem solving strategies: The problem solving strategies that we teach include - working systematically, reasoning a conclusion of why something may be true but not yet proven, visualising, working backwards, identifying patterns and using trial and error.

Types of Problems: There may be problems that are - visual problems, word problems, finding every possibility problem, logic problems and pattern problems.

Our Curriculum:

Key Maths skills are taught daily, through the use of our scheme, White Rose Maths. To ensure a range of resources are used, we use: Planpanion (previously deepening understanding) and Classroom Secrets to support the teaching of the mathematical

concepts within our curriculum. Children have consistent and sequential lessons which focus on key mathematical skills including place value, the four operations and fractions. The range of reasoning resources are used to challenge all children and give them the opportunity to reason their understanding to ensure they are actively involved with their learning. Children are also encouraged to use a variety of representations to prove their thinking including, number sentences, verbal explanations, written sentences, bar models, part whole models and using physical resources.

Mathematics Teaching and Learning: In every mathematics lessons across the whole school, you will see the following:

- Quality first teaching; tailoring to meet the needs of the learners within each class, and suitable interventions being used to address any gaps in learning.
- Resilient and motivated learners with a learning environment that promotes a 'can-do' attitude.
- Teachers and teaching assistants use high-quality questioning to explore children's understanding and develop their understanding further.
- Teachers use misconceptions to further the children's understanding of the key concepts.
- Learners are being provided with a range of opportunities, through careful planning, to explore for longer and go deeper in mathematical concepts.
- Progression of fluency, reasoning and problem solving activities.
- Teachers and teaching assistants model new learning through teaching inputs.

Disadvantaged and SEND:

Our mathematical approach at Twyning has been carefully designed to support all children in being able to develop their understanding of mathematics including those children with SEND or those from disadvantaged backgrounds. There are opportunities to consolidate and revisit within our ambitious curriculum that enables all to be able to access. Our adaptation of the white rose maths curriculum to fit with our mixed-age structure in school is planned out to enable children to *'keep up'* with their learning to avoid the need to *'catch up'*.

Adaptive Teaching in Mathematics:

Our lessons are adapted by: breaking lessons up into small chunks, information is rephrased so it is accessible for all, allowing time for questioning, using tailored resources (including widgit resources), pre-teaching skills that will be taught, pre-teaching prior vocabulary, peer support, targeted support from a teacher or teaching assistant, adults using manipulatives with the children to support, practise time using any resources, demonstrating examples of finished pieces, turn taking demonstrations, Widgit vocabulary for visual learners, ensuring vocabulary is embedded, encouraging talk partners and small group work.

Non-negotiables:

- Do it, Secure it and Deepen it language is used in maths lessons to demonstrate fluency, reasoning and deep problem solving. All staff will be confident to use this terminology.
- High-quality terminology will be used by staff and understood by the children.
- All children will be exposed to Do it, Secure it and Deepen it style questions during the teaching episodes.
- Children will be encouraged to write in their maths books and not on worksheets.
- All children will have a 'front cover' sheet in their books that has clear learning objectives and key vocabulary on it.
- Maths working walls to clearly show the current learning objective.
- Adults will model the use of manipulatives linked to that learning objective.

Manipulatives:

Within each class:

Reception (Rabbits) - numicon, numberblocks, tens frames and counters, counting bears, gems, number pebbles, part whole models, shapes (2d and 3d), number lines, measuring scales.

Year 1 and 2 (Squirrels) - foam tens frames, base 10, money, numicon, 2D and 3D shapes, number beads up to 50, place value counters, number lines, 100 squares, part whole models, clocks, fraction wall, fraction circles, measuring tapes, digit cards and dice.

Year 2 and 3 (Foxes) - base 10, numicon, money, 2D and 3D shapes, clocks, fraction circles, fraction wall, counters, number lines, number frames, part whole models, times tables grids and 100 squares.

Year 4 and 5 (Hedgehogs) - base 10, numicon, fraction wall, multilink cubes, counters, place value charts, fraction walls, times tables grids, coins and notes, 3D and 2D shapes, measuring scales, compasses, dice, number lines, fraction circles, graph paper, metre sticks and protractors.

Year 5 and 6 (Owls) - base 10, numicon, fraction wall, multilink cubes, counters, place value charts, fraction walls, times tables grids, coins and notes, 3D and 2D shapes, measuring scales, compasses, dice, number lines, fraction circles, graph paper, metre sticks, protractors and thermometers.

Daily Hit the Button practise is used for Key Stage 2 pupils to support children's fluency and accuracy in times tables. They have frequent access to this within school as well as access to it at home.

Impact

The impact of our mathematics curriculum is monitored through the use of our assessment tool, Insight. We combine our summative assessments with book looks, lesson drop ins/observations and pupil voice.

At the end of each year we expect the children to have achieved Age Related Expectations (ARE) for their year group. Some children will have progressed further and achieved greater depth (GDS). By the end of KS2 (when the children leave Twyning School) we aim for children to be fluent in the fundamentals of mathematics with a conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. They will have the skills to solve problems by applying their understanding to a variety of situations with increasing sophistication, including in unfamiliar contexts and to model real-life scenarios.

Children will leave Twyning School being able to reason mathematically by following a line of enquiry and develop and present a justification, argument or proof using mathematical language. As a result of well-planned and structured lessons children are engaged and challenged daily. In all year groups, children will be confident and excited to talk about Maths and their learning and the links between Mathematical topics. All children will be able to succeed and be proud of their progress. They will be resilient, confident and secure in the concepts of maths both within and outside of Maths lessons.