

# Maths whole-school framework

## Ensuring consistency and coherence



Teaching aims to develop conceptual understanding alongside procedural fluency. Use of practical apparatus to support understanding of number and calculation is embedded across school with regular training sessions to develop shared methodologies. This along with clear calculation guidelines ensures that pupils are moved through concrete, pictorial and abstract representations in a planned sequence and at an appropriate pace.

**Reasoning (mathematical thinking) :** Reasoning is expected to be high in all year groups. All children are expected to respond using mathematical vocabulary in full sentences explaining their thinking. Through reasoning, children are able to extend their understanding beyond arithmetic.

KS2 children are expected to:

- Describing – saying what happened.
- Explaining – beginning to offer reasons for what was done
- Justifying – a correct logical argument which has a complete chain of reasoning to it.
- Proving – a watertight argument that is mathematically sound.

**For example: Consecutive numbers**

If I add three consecutive numbers, will I get an odd or an even answer? Children would use apparatus to explore this. Can you prove that you are right?

Ideas such as this can be explored with increasing depth as children progress through school and their reasoning skills develop.

**Fluency:** We aim to ensure that all pupils become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time. Oral Mental Maths is a feature of every day learning to ensure pupils develop the ability to retrieve number facts rapidly; catch-up and differentiated sessions are planned for pupils as required. Times table activities and tests are routine from Year 2.

Through this approach, we provide all children with the opportunity to develop procedural and conceptual fluency. Children are required to reason and make connections between calculations. The connections made improve their fluency.

**For example: Don't count, calculate**

Young children benefit from being helped at an early stage to start calculating, rather than relying on 'counting on' as a way of calculating. For example, with a sum such as:  $4 + 7 =$

Rather than starting at 4 and counting on 7, children could use their knowledge and bridge to 10 to deduce that because  $4 + 6 = 10$ , so  $4 + 7$  must equal 11.

**Problem Solving:** Children are given opportunity to apply their mathematics to a variety of routine and nonroutine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions. Planning ensures that problems are designed to deepen children's understanding of essential concepts through 'intelligent practice' or 'variation'.

**For example: Developing children's understanding of the = symbol**

The symbol = is an assertion of equivalence. If we write:  $3 + 4 = 6 + 1$  then we are saying that what is on the left of the = symbol is necessarily equivalent to what is on the right of the symbol. But many children interpret = as being simply an instruction to evaluate a calculation, as a result of always seeing it used thus:

$$3 + 4 = \qquad 5 \times 7 = \qquad 16 - 9 =$$

If children only think of = as meaning "work out the answer to this calculation" then they are likely to get confused by empty box questions such as:

$$3 + \square = 8 \quad \text{Later they are very likely to struggle with even simple algebraic equations, such as: } 3y = 18$$

Therefore, children are taught to answer empty box problems with variation of the position of the = sign from an early age.

**Whole School Approach:**

Teachers are of the belief that all pupils are capable of achieving high standards and challenge is part of everyday maths for all pupils.

Our Curriculum incorporates the 5 big ideas; Fluency, Mathematical Thinking, use of Representation and Structure, Procedural and Conceptual Variation and Coherence into every maths lesson.

The needs of all pupils are looked at on a daily basis; support is provided through same day intervention for those who did not grasp concepts and challenge is provided through depth of both planned activities and higher order questioning for those for whom concepts were well understood.

**Calculation Guidance:** is clear and supports progression through the year groups.