



# Maths

## The Tilstock Way

# *What is our intent?*

We want all Tilstock pupils to:

- know more and remember more.
- to develop number sense in the early years of school
- to enjoy and achieve within their learning so that they develop confidence in mathematics.
- Have the best possible start for our pupils' by closing the gap in knowledge through teaching pupils core facts, formulae and concepts which form the building blocks for the next stages of education.
- to develop 'automatic recall' of key concepts to prevent their working memory from becoming overloaded.
- To achieve the age-related expectations.

# How will we implement this?

Though our intent of pupils *knowing more and remembering more*, pupils' mathematical knowledge is split into three types:

1. 'I know that' - facts and concepts.
2. 'I know how' - the sequence of steps.
3. 'I know when' - strategies to reason and problem solve.

Within each topic, pupils will use these three types, so that their knowledge of the relationships between mathematical concepts will develop over time.

We will do this by ensuring that

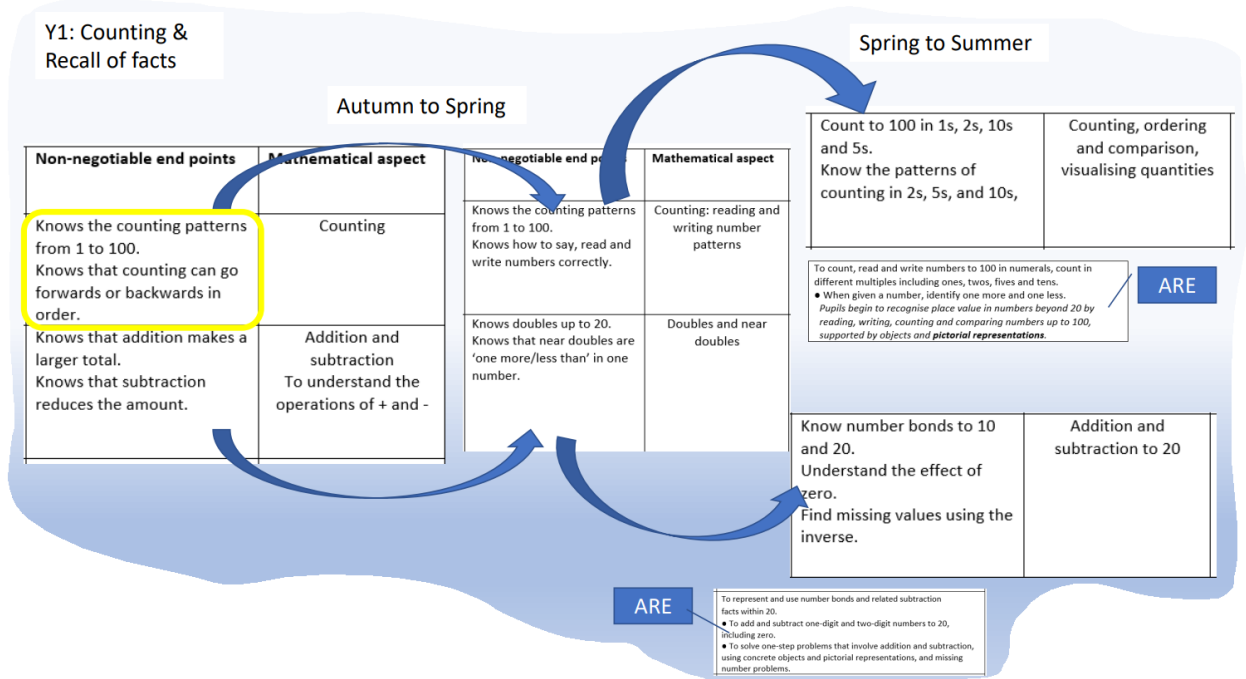
- Pupils are not rushed through a topic, as some pupils may need more time than others.
- We adapt the curriculum to the needs of our learners.
- We have a spiral curriculum that revisits topics of work throughout the year.
- Teach in small steps, following a teaching sequence of concrete, pictorial, abstract.
- We follow the Rosenshine's principles to ensure that we do not overload our pupil's working memory

# Our Maths Medium Term Planning

Our Maths planning ensures that we

- know what order to teach the content in.
- are able to focus on curriculum goals (non-negotiable end points)
- are able to track progress across the terms to meet ARE
- are able to allow for returning to themes and topics for knowing more and remembering more
- are able to allow for professional judgment on how long to spend on aspects that require more /less teaching time
- pair useful facts and efficient and accurate methods within a topic sequence.
- teach strategies for solving problem types once pupils can recall and deploy facts and methods with speed and accuracy

# Our Medium Term Plans



## Mixed age planning

Y1/2 & 3/4 Teaching the properties of place value with two, three and four digit numbers

Medium Term Planning: Autumn term Class – Y1/2.

Week.	Mathematical aspect	Non-negotiable end points Year 1.	Non-negotiable end points Year 2.	Curriculum statements – Year 1.	Curriculum Statements – Year 2.
1.	Number and place value: counting, reading and writing 2-digit numbers, place value	Knows the counting patterns from 1 to 100. Knows that counting can go forwards or backwards in order.	Knows the properties of two digit numbers. Knows that counting can be done in varying step sizes.	<ul style="list-style-type: none"> <li>To count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number.</li> <li>To identify and represent numbers using objects and pictorial representations including the number line, and use the language of equal to, more than, less than (fewer), most, least.</li> </ul>	<ul style="list-style-type: none"> <li>To count in steps of 2, 3, and from any number, forward or backwards, including zero.</li> <li>To recognise the place value in a two-digit number (tens, ones).</li> <li>To identify, represent and estimate, using concrete objects and pictorial representations, including the number line, the number of objects in a group to 100; use &lt;, &gt; and = signs.</li> <li>To read and write numbers to at least 100 in numerals and in words.</li> </ul>

Medium Term Planning: Autumn term – Y3/4.

Week.	Mathematical aspect	Non-negotiable end points Year 3.	Non-negotiable end points Year 4.	Curriculum statements – Year 3.	Curriculum Statements. Year 4.
1.	Number and place value: properties of place value,	Knows the properties of place value for three-digit numbers.	Knows the properties of place value for four-digit numbers.	<ul style="list-style-type: none"> <li>To recognise the place value of each digit in a three-digit number (hundreds, tens, ones).</li> <li>To compare and order numbers up to 1000.</li> <li>To read and write numbers up to 1000 in numerals and in words.</li> </ul>	<ul style="list-style-type: none"> <li>To recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones).</li> <li>To order and compare numbers beyond 1000.</li> </ul>
Links to resources and policy documents:				$400 + 90 + 2$ 492 Four hundred and ninety two  $500 + 40 + 7$ 547 Five hundred and forty seven  $200 + 4$ 204 Two hundred and four	Arrange the given digits to make a number that meets the given criteria. Between 3000 and 3500: 2, 9, 3, 4 TH H T O

It is important for every topic that teachers know what pupils already knew and understood, have a clear purpose of the lesson and how it fits into a sequence of lessons over time.

# Pedagogy

- Teachers routinely check that pupils are secure with prerequisite content.
- Teachers connect new learning to prior understanding.
- Pupils have sufficient practice and consolidation through well-designed activities and exercises.
- Adults check that all pupils are developing procedural fluency.
- Adults reduce distractions and support pupils to focus.
- Adults support younger children to learn addition facts off by heart.
- Teachers ensure questioning is focused on recall rather than guesswork.
- Adults provide pre-teaching, additional teaching and extra practice for most pupils with SEND.
- Activities in pupils' books show progression from small component tasks to more complex procedures and processes.
- Explicit teaching of vocabulary helps pupils understand and remember more, especially when it is introduced at the start of the lesson so that pupils have ample opportunity to practise.

# Declarative, procedural and conditional Knowledge

## **Declarative Knowledge – NumberSense & NCETM**

- Pupils learning fact families off by heart. The Y4 multiplication check has raised the profile of times tables.
- KS1 pupils are expected to memorise the number bonds. The NCETM's Mastering Number programme has been helpful in supporting Reception and Y1 pupils to memorise number bonds.
- Vocabulary, sentence stems and speaking frames are taught and deployed effectively to support pupils' language which in turn supports their reasoning.
- Emphasis is placed on the ability by younger pupils to subitise and easily recall facts to develop automaticity to achieve the speed and accuracy. This helps them to remember new knowledge.
- Pupils are not rushed through the curriculum; teachers are encouraged to slow the pace of learning, when necessary, so that pupils master knowledge before moving on.

## **Procedural Knowledge – Teaching Input and practice through 'Target Your Maths'**

- Our curriculum sequences procedural knowledge in a logical way. Understanding can sometimes be prioritised over automaticity and fluency. Efficient methods help pupils engage with larger numbers without creating additional complication (e.g. using the grid method helps understanding but long multiplication is more efficient).
- How to present working out is a key part of the mathematics curriculum.
- Using the bar model as a common representation supports pupils in understanding proportion as well as how to solve word problems and algebraic equations.
- Procedural fluency is a priority: a lack of it is a likely cause of needing interventions in Year 6.

## **Conditional Knowledge – Tilstock Calculation Policy**

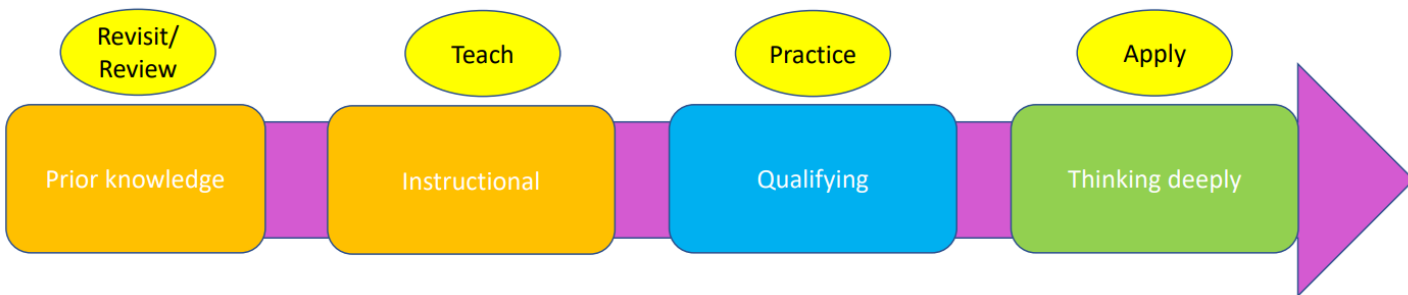
- Our calculation policy specifies the models, explanations and sentence stems to teach pupils for wider problem-solving.
- At the end of each teaching sequence, there is a lesson dedicated to teach problem solving. This ensures that all pupils will receive the necessary procedural practice and practice in problem solving because there is regular dedicated time to do this.
- Fluency, language and comprehension are identified as key factors to reasoning and problem solving.
- We ensure we teach how to apply methods to problems, based on the underlying mathematical structures.

# Meeting the Needs of Pupils

- Our 'keep up, not catch up' approach makes sure that pupils really understand and remember what is being taught before they move on.
- This approach works well for children with SEND, meaning they can access the same curriculum with support and adaptations.
- Pre-teaching and same-day interventions are effective ways of 'keeping up'.
- For children working well below age-related expectations, precision teaching focused on specific gaps might be more appropriate.
- It is important to reflect on whether practice is inclusivity in reality or only in appearance. Some children with SEND cannot access the content of the class, despite the quality of teaching. Such children might have their needs met more effectively if they learn different content and practise with different tasks.
- The quality and quantity of practice and of handwriting proficiency are likely contributors of holding children back – both for children with and without SEND.
- A lack of sufficient practice for pupils with challenging behaviour can cause less progress and lead towards a vicious cycle of poor behaviour due to not understanding the content. This can lead to falling behind and being labelled as having SEND.

# Our teaching sequence

## The Teaching Sequence – the lesson journey



1. Effective modelling of the mathematics to secure fluency, technical vocabulary and notation - instructional
2. An emphasis on learning through practice, with regular opportunities for pupils to talk both individually and in groups - qualifying
3. An expectation that pupils will accept responsibility for their own learning and work independently – thinking deeply

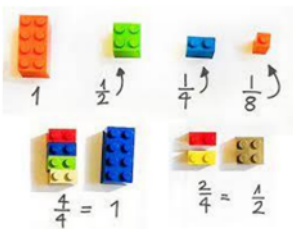
# Concrete, Pictorial, Abstract

## Learning a new idea

Concrete, Pictorial, Abstract (CPA) is a highly effective approach to teaching that develops a deep and sustainable understanding of maths in pupils. Often referred to as the concrete, representational, abstract framework, CPA was developed by American psychologist Jerome Bruner.

### Concrete models

Understand the concept  
Fix in the long term memory



Concrete is the “doing” stage. During this stage, students use concrete objects to model problems.

### Pictorial representations

Apply the concept  
Recall from long term memory



Pictorial is the “seeing” stage. Here, visual representations of concrete objects are used to model problems. This stage encourages children to make a mental connection between the physical object they just handled and the abstract pictures, diagrams or models that represent the objects from the problem.

### Abstracts

Match the concrete/  
pictorial to mathematical  
symbols and language

$$\frac{6}{7} + \frac{3}{5}$$

Abstract is the “symbolic” stage, where children use abstract symbols to model problems. Students will not progress to this stage until they have demonstrated that they have a solid understanding of the concrete and pictorial stages of the problem.

# Practice

Practice can be considered as two types.



- Type 1 – involves retrieving and rehearsing facts, methods and strategies so that they are familiar, speedy and accurate (Fluency = **Numbersense**. Maths & Strategies = **Target Your Maths**)
- Type 2 – requires pupils to explain relationships, prove they understand them and describe their reasoning (**I See Maths Reasoning**)

Both types of practice are important. **Pupils need sufficient quantity and quality of practice to support understanding and commitment of content to long term memory.**

Practice can include songs, games and rhymes.

Practice should be accompanied by **checks to ensure that all pupils are learning the intended knowledge to automaticity** – before moving on..

- Accompanying worksheets are often well-designed and **include worked examples**.
- Teachers consistently build in **opportunities to rehearse knowledge**, such as by using 'Fluent in 5'. Additional, discrete sessions are helpful but may indicate deficiencies in the design and implementation of the curriculum.
- In Reception and Nursery, the planned mathematical activities are purposeful and carefully designed. Leaders have a system for monitoring children's **access to maths resources in the wider provision**, to ensure all children have opportunity to practice.
- We know there is an association between older pupils' confidence and the quality of their book work. **Quality and quantity of practice** is likely to be linked to how well these pupils focus on their learning and the effort that they make.
- Songs are particularly useful to helping children remember important knowledge.
- '**My turn, your turn**' and '**choral response**' are positively used for low-stakes practice. It is an inclusive approach which reduces anxiety. Although it is repetitive, it is necessary for pupils to secure the language and concepts.
- Through **adaptation rather than differentiation**, we avoid a variation in pupils' diets which can cause gaps. This is often related to when pupils choose activities or move on very quickly and 'get ahead' of others. A minimum expectation of what should be completed is used to address this.



# Assessment

- Live marking means that teachers can notice pupils' successes, misconceptions and errors. It allows for responsive teaching as well as helping identifying children who need same-day short interventions.
- We use regular end-of-unit tests which are aligned to the school's curriculum. Pupils are tested on what they have learned and practised, highlighting to the teacher and subject leader which forms of knowledge need to be revisited. We use NFER to assess pupils each term.
- Technology, such as Maths Whizz, can be used effectively for testing: it motivates pupils to retake tests to do better, provides low-stakes practice, and precise information about pupils' component knowledge and readiness to move on to the next topic.
- Pupils like frequent, low-stakes and timed testing as they could achieve personal bests: they can also reduce fear of SATs. Such testing means that children do not feel under pressure to perform or compare themselves with others. It also contributes to a positive culture which welcomes mistakes.

# Key take aways

**Pitch lessons high and scaffold up** - let children know that I am not capping what they can do. Maths pitched at the right level so that pupils are challenged to think hard enough about their maths knowledge.

**Use a range of concrete and pictorial representations**, teach vocabulary explicitly, regularly check for understanding and are adept at picking up on misconceptions.

**Adaptive teaching needs to be used to scaffold** the learning for those who need it and challenge for the more able.

**Previous knowledge is referred to encourage recall. Prior learning to be taken from our Year group Must Have** statements and assessed.

**Pupils should practise until they have learned the content to automaticity. Quality and quantity of independent practice opportunities** is one of the main priorities. Regular practice ensures pupils are remembering important knowledge, which affects older pupils' procedural fluency. Pupils in EYFS and KS1 access some fluency soon enough to meet EXS.

**Consistent use of success criteria within teaching sequences.** Success criteria to be placed in books at the start of the sequence

**End of learning and sequence to be captured as memory statements**, including generalisations and key knowledge to be memorised.

**Adults always check the outcomes** for significant groups.

**Reasoning and problem solving to be enhanced through strategic teaching and practice at the end of each teaching sequence.** Problem solving is referenced, and the recording demonstrates what skills they are using. The children will be able to explain what the learning was, and the instructional teaching is apparent.

**Teachers model effectively** and use mathematical vocabulary to make connections.

**Practice models are always recorded in the books** as a prompt and reminder of processes and what successful outcomes look like. This will enhance scaffolding.

**Presentation of a high enough standard is insisted upon.** Pupils take responsibility for sticking in their own sheets, Use of the ruler and setting out for procedures for neatness and precision.

**All children should be secure with their understanding of the purpose of procedures.** They should know that it is important to complete tasks to build confidence, and recognise the importance of recalling tables. They should know it is important to set their work out neatly.

# Impact

- Teachers will plan frequent, low-stakes assessments throughout the 'learning journey' to help pupils prepare for assessments that focus on what pupils have actually learnt.
- Using low stakes testing will not only increase knowledge retention, but also improve pupils confidence in maths.
- Using lessons to incorporate timed testing (The 99 club) can help pupils to develop fluency and give teachers the reassurance that 'pupils are not reliant on derivation' to calculate their answers.
- By planning regular assessments to 'engineer proficiency' and promote success, pupils can see tests as 'moments to shine' and even look forward to them.