West Witney Primary School and Nursery

Teaching for Maths Mastery Policy

Spring Term 2026

Headteacher: ***Mr S Birnage***

Chair of Governors: ***Mrs L Upson***

Review Date: Spring Term 2028

Teaching for Maths Mastery Policy

'Children can and will achieve in maths'

Rationale and Intent

Teaching for mastery is based on highly effective teaching and learning. It is based on the ethos that all can, and will achieve. At West Witney we believe that teaching for mastery involves:

- Deep and sustainable learning
- Building on what children have already learnt
- Reasoning and making connections
- Staff continually developing their specialist knowledge for teaching maths, working collaboratively to refine and improve their teaching.
- Keeping the class working together so that all can access and master maths.
- Spending longer on key topics; go glow to go faster later.

The principles of teaching for mastery are aligned to the aims of the maths National Curriculum:

- Fluency
- Reason mathematically
- Problem solving

Evidence of impact

The Education Endowment Foundation have documented the positive impact the principles of teaching for mastery has on children's outcomes.

Further reading can be found here. The Development of Maths Capabilities and confidence in Primary School (2009) research highlights the importance of reasoning and mathematical thinking :

The children's scores in the mathematical reasoning tasks were consistently and strongly related to their achievement in mathematics. Our analyses certainly showed that teaching children about calculation is not wasted time, since the ability to calculate proved to be a good predictor of mathematical success. However, the far stronger relation

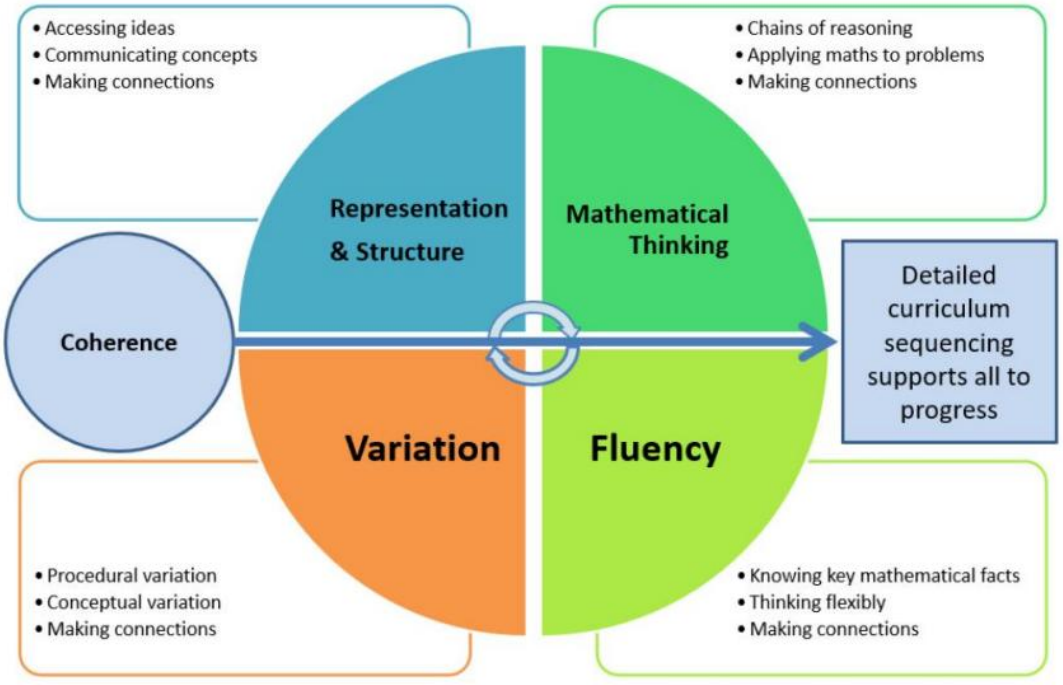
between mathematical reasoning and mathematical achievement is evidence that there is a genuine need for teachers to spend ample time ensuring that their pupils know what quantitative relations are and how to reason about them logically and enterprisingly.

(Nune, 2009)

In a piece of research carried out by the National Centre for Excellence in the Teaching of Maths (NCETM) over a period of a year between a year 1 and year 7 cohort of children that received a teaching for mastery approach and a cohort that didn't they found:

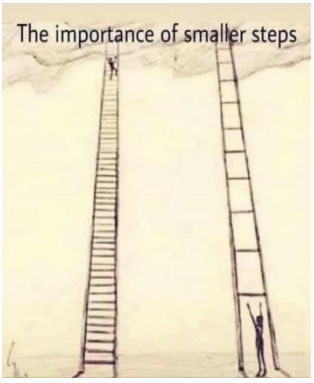
- On average, Mathematics Mastery pupils made more progress than non-Mathematics Mastery pupils.
- The positive impact was estimated as equivalent to one month's additional progress. The effect detected was statistically significant, meaning the improvement was likely caused by the programme.
- The programme had more impact on pupils in Year 1, who made approximately two additional months' progress on average. In Year 7, Mathematics Mastery pupils made approximately one additional month's progress on average.
- Given the low per-pupil cost, Mathematics Mastery represented a cost-effective programme for schools.

Principles of Teaching for Mastery



Five Big Ideas of Teaching for Mastery, updated November 2022

Coherence



Teaching is designed to enable a coherent learning progression through the curriculum, providing access for all pupils to develop a deep and connected understanding of mathematics that they can apply in a range of contexts. Small steps of progress ensure all children are able to be successful in their maths learning.

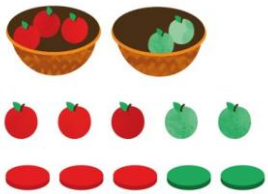
Representation and Structure

Teachers carefully select representations of mathematics to expose mathematical structure. The intention is to support pupils in 'seeing' the mathematics, rather than using the representation as a tool to 'do' the mathematics. These representations become mental images that students can use to think about mathematics, supporting them to achieve a deep understanding of mathematical structures and connections.

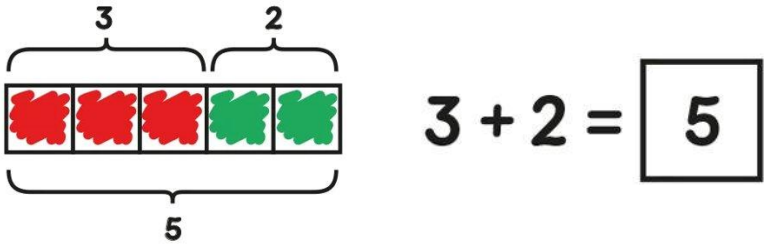
Concrete, Pictorial and Abstract representations are used to deepen understanding.

Concrete- **the doing stage**. CPA approach brings concepts to life by allowing children to experience and handle physical (concrete) objects.

Pictorial- **the seeing stage**. 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.



Abstract - **the symbolic stage**. 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.



Common representations are used across the school with a clear rationale for using a particular manipulative or representation to teach a specific mathematical concept. A manipulative enables a pupil to understand mathematics by illuminating the underlying general relationships, not just 'getting them to the right answer' to a specific problem. Manipulatives and representations can be used to support pupils of all ages. The decision to remove a manipulative should be made in response to the pupils' improved knowledge and understanding, not their age. Manipulatives should act as a 'scaffold', which can be removed once independence is achieved.

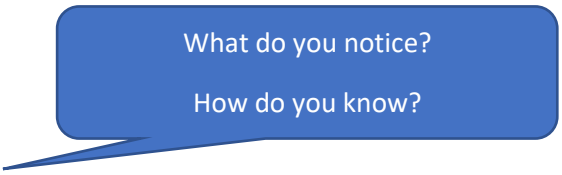
Mathematical Thinking

Mathematical thinking is central to how pupils learn mathematics and includes looking for patterns and relationships, making connections, conjecturing, reasoning, and generalising. Pupils should actively engage in mathematical thinking in all lessons, communicating their ideas using precise mathematical language.

Reasoning strategies may include:

- Spot the mistake / Which is correct?
- True or false?
- What comes next?
- Do, then explain
- Make up an example / Write more statements / Create a question / Another and another
- Possible answers / Other possibilities
- What do you notice?
- Continue the pattern
- Missing numbers / Missing symbols / Missing information/Connected calculations
- Working backwards / Use the inverse / Undoing / Unpicking
- Hard and easy questions
- What else do you know? / Use a fact
- Fact families
- Convince me / Prove it / Generalising / Explain thinking
- Make an estimate / Size of an answer
- Always, sometimes, never
- Making links / Application
- Can you find?
- What's the same, what's different?
- Odd one out
- Complete the pattern / Continue the pattern
- Another and another
- Ordering
- Testing conditions
- The answer is…
- Visualising

The magic two mathematical thinking questions at West Witney are:

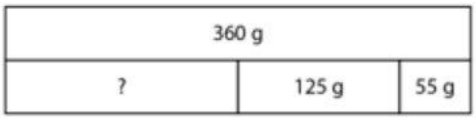


<u>Progression of Reasoning</u>

***Step one*:** Describing: simply tells what they did.
***Step two*:** Explaining: offers some reasons for what they did. These may or may not be correct. The argument may yet not hang together coherently.
***Step three*:** Convincing: confident that their chain of reasoning is right and may use words such as, 'I reckon' or 'without doubt'. The underlying mathematical argument may or may not be accurate yet is likely to have more coherence and completeness than the explaining stage.
***Step four*:** Justifying: a correct logical argument that has a complete chain of reasoning to it and uses words such as 'because', 'therefore', 'and so', 'that leads to'...
***Step five*:** Proving: a watertight argument that is mathematically sound, often based on generalisations and underlying structure.

Stem Sentences

Sentence stems (sentence starters and cloze sentences) scaffold children's ability to explain their learning. Explaining their learning will help embed their learning. Examples:

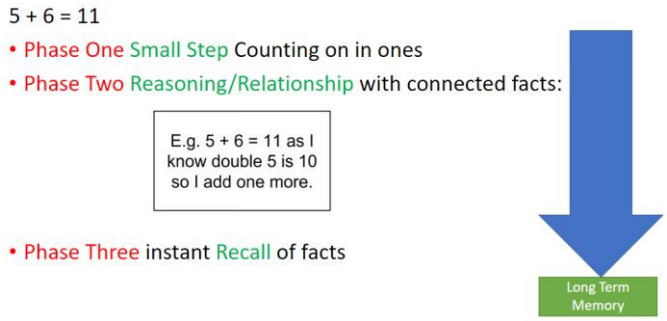
This is a whole ___ because I have all of it.	Language/ Structure	 This is a whole apple because I have all of it.
The whole minus the known part(s) is equal to the missing part. The sum of the known part(s) plus the missing part is equal to the whole	Generalisation	

Teachers use stem sentences on whiteboards and/or in books to support children explain and reason.

Fluency

Efficient, accurate recall of key number facts and procedures is essential for fluency, freeing pupils' minds to think deeply about concepts and problems, but fluency demands more than this. It requires pupils to have the flexibility to move between different contexts and representations of mathematics, to recognise relationships and make connections, and to choose appropriate methods and strategies to solve problems.

The phases of teaching number facts:



<u>Multiplication</u>

Multiplicative facts are stored in our verbal memory so saying and hearing the sound patter of the phrase is important e.g. Seven times three is twenty one. Tips for teaching and learning multiplication:

- Learn as a memorised phrase by repeating sound pattern out loud.
- Learn each fact one way round first, then get confident in switching factors.

3 x 4 = 12

4 x 3 = 12

- Don't think! Say the WHOLE number sentence out loud and see if the answer trips off your tongue. If not, try the commutative and see if it comes then.
- Learn one new fact at a time. Go slow to go faster later.
- Importance of commutative law and the relationship with division facts.
- Rote learning in which children learn the number facts AND a learned sound pattern.

In Years 3 and 4, times tables are practised daily and tested weekly. The overview of when times tables are practiced can be seen in Appendix A.

Variation

The purpose of variation is to draw closer attention to a key feature of a mathematical concept or structure through varying some elements while keeping others constant.

- Conceptual variation involves varying how a concept is represented to draw attention to critical features. Often more than one representation is required to look at the concept from different perspectives and gain comprehensive knowledge.
- Procedural variation considers how the student will 'proceed' through a learning sequence. Purposeful changes are made in order that pupils' attention is drawn to key features of the mathematics, scaffolding students' thinking to enable them to reason logically and make connections.

Intelligent Practice

Teachers 'design questions that avoid mechanical repetition and create an appropriate path for practising the thinking process with increasing creativity' (Gu, 1991). Intelligent practice should highlight mathematical concepts and when used correctly, will deepen children's conceptual as well as procedural understanding. Example of intelligent practice:

Set A	Set B
120 – 90	120 – 90
235 – 180	122 – 92
502 – 367	119 – 89
122 – 92	235 – 180
119 – 89	237 – 182
237 – 182	502 – 367

EYFS Curriculum and Planning

In Nursery and Reception, the maths curriculum is sequenced within the provision using Birth to 5 Matters statements. These are coherently planned from Nursery to the end of Reception over the three long terms. EYFS also use the Mastering Number resources from NCETM.

Year 1 – 6 Curriculum

At West Witney, we follow the NCETM Curriculum Prioritisation framework to support planning and teaching. This resource provides coherent sequencing for the primary maths curriculum. It draws together the DfE guidance on curriculum prioritisation, with the high-quality professional development and classroom resources provided by the NCETM Primary Mastery PD materials. A Year 1 – 6 overview can be found here. In Years 1 and 2 they use the Mastering Number resources from NCETM.

Planning in Year 1 – 6

Staff use the high quality NCETM Curriculum Prioritisation PowerPoints and professional development resources to plan their lessons. The NCETM PowerPoints are used as a starting point and staff adapt them to meet the needs of the children in their class and the content being taught. They use their understanding of teaching for mastery to craft their lessons.

In the classroom

- Pupils are taught through whole-class interactive teaching, enabling all to master the concepts necessary for the next part of the curriculum sequence.
- In a typical lesson, the teacher leads back and forth interaction, including questioning, short tasks, explanation, demonstration, and discussion, enabling pupils to think, reason and apply their knowledge to solve problems.
- Use of precise mathematical language enables all pupils to communicate their reasoning and thinking effectively.

- If a pupil fails to grasp a concept or procedure, this is identified quickly, and gaps in understanding are addressed systematically to prevent them falling behind. Keep up, not catch up.
- Significant time is spent developing deep understanding of the key ideas that are needed to underpin future learning.
- Key number facts are learnt to automaticity, and other key mathematical facts are learned deeply and practised regularly, to avoid cognitive overload in working memory and enable pupils to focus on new learning
- Teachers use the lesson template (Appendix B) to plan their lesson. This is used as a guide but teachers will adapt it to meet the needs of the children in their class and to the content being taught.

Parameters of Expectation (PoEs)

As in many areas of teaching and learning at West Witney, there are clear PoEs for staff to follow for teaching for mastery. PoEs ensure there is flexibility within set expectations. This ensures:

- Consistent teaching for mastery strategies used across the school.
- Teaching and learning is consistent enough that all children receive high quality education based on evidence and good practice.
- Teaching and learning is flexible enough that it is tweaked to meet the needs of pupils in your class and the content being taught.

Appendix C details the PoEs.

Slower Graspers and SEND

Through small steps, modelled mathematical vocabulary, intelligent practice, well-chosen representations and learning that builds on previous learning, it is expected that all children will move through the curriculum at roughly the same pace. However, in practice we know that this is not always the case. Adults work hard to help children keep up, rather than having to catch up. This will involve:

- Scaffolding (this might include concrete or pictorial representations)
- Pre-teaching
- In class intervention
- Post-teaching
- Thought through high-quality interventions from the school's intervention menu.

Those children with more complex SEND or cognitive difficulties that may have a different programme and this will be outlined in their Inclusion Plan. This programme is still taught using the mastery principles.

Quick Graspers

The vast majority of children have the potential to master their learning. A large number of these children will show mastery at greater depth.

Mastery

- To be able to use mathematical concepts, facts and procedures appropriately, flexibly and fluently.
- To use reasoning both to explain known mathematical concepts and procedures and to use them to solve problems.

Mastery with greater depth

- To solve non-routine problems (i.e. where the approach is not immediately obvious) demonstrating creativity and imagination.

- To explore and investigate mathematical contexts and structures, to communicate results clearly and systematically and to explain, generalise and prove results.

All children are entitled to think deeply about the maths! But some will go even deeper!

Children that grasp a concept quicker than some other children, have their thinking and understanding challenged in lessons. This is done by providing opportunities for children to make connections, see relationships and clearly explain their understanding. This will involve the children having to use the same skill in a different context or situation. Teachers regularly provide Dong Nao Jin questions ('make your brain think') to think even deeper. All children should be exposed to these questions at points in their learning.

Example progression to mastery with greater depth (LO: I will use known facts to find a two-digit number and a one-digit number that compose 100):

Prove/Fluency	Apply	Challenge
'Fill in the missing numbers'. 100 – 1 = ☐ 99 + ☐ = 100 100 – 2 = ☐ 98 + ☐ = 100 100 – 3 = ☐ 97 + ☐ = 100 *'Fill in the missing numbers.'* 100 → 7, ? 100 → ?, 93 *'Fill in the missing numbers'.* 93 + ☐ = 100 100 – 6 = ☐ ☐ + 97 = 100 100 – 2 = ☐	*'Dylan says that one hundred minus six is forty. Explain his mistake and think of a way to show him what the correct answer is.'*	☐ + ☐ + ☐ ☐ The total is 100. Write in the missing digits. Now, use these digits to make the above equal 100. 4. 1 9 5 Martha had £1. She bought three penny sweets and a lolly for 5p. How much money did she have left? Show how you worked it out on the bar model below.

Assessment

Adults carry out low stakes assessment in every maths lessons. This is completed during paired or independent learning time through various assessment for learning strategies. If a child is struggling to grasp the concept, in class or post-teaching intervention is put in place to help children keep up. Children are part of the assessment process and, where appropriate, will mark their own learning so that they can spot mistakes and identify any misunderstandings. Three times a year, Year 1 - 6 children complete a PiXL maths assessment. This is then put into individual children's Question Level Analysis (QLAs). This produces an age-related standard, as well as clearly identifies gaps in learning. This is used to plan interventions which are outlined in the Intervention Plans and discussed at Pupil Progress meetings.

Resources

As well as the NCETM Curriculum Prioritisation PowerPoints and professional development resources, staff use high quality resources such as 'I See Materials' by Gareth Metcalfe and other NCETM materials. These are easily accessible in the Maths Resources folder in the Staff Share Point.

Celebrating Maths

Marking and Feedback

Feedback and Marking expectations are outlined in the school's Feedback Policy.

Appendix A Time Tables

If you know that:

- Any factor multiplied by zero equals zero.

E.g. 9 x 0 = 0 0 x 58 = 0

- Any factor multiplied by 1 equals the factor itself.

E.g. 3 x 1 = 3 1 x 86 = 86

Any factor multiplied by 10 equals tens times larger

E.g. 8 x 10 = 80

- The commutative property of multiplication - It doesn't matter what order that you multiply factors in, the product will be the same.

E.g. 6 x 4 = 24 and 4 x 6 = 24

Then there are only 36 multiplication facts required for formal written multiplication.

1 × 1	1 × 2	1 × 3	1 × 4	1 × 5	1 × 6	1 × 7	1 × 8	1 × 9	1 × 10	1 × 11	1 × 12
2 × 1	2 × 2	2 × 3	2 × 4	2 × 5	2 × 6	2 × 7	2 × 8	2 × 9	2 × 10	2 × 11	2 × 12
3 × 1	3 × 2	3 × 3	3 × 4	3 × 5	3 × 6	3 × 7	3 × 8	3 × 9	3 × 10	3 × 11	3 × 12
4 × 1	4 × 2	4 × 3	4 × 4	4 × 5	4 × 6	4 × 7	4 × 8	4 × 9	4 × 10	4 × 11	4 × 12
5 × 1	5 × 2	5 × 3	5 × 4	5 × 5	5 × 6	5 × 7	5 × 8	5 × 9	5 × 10	5 × 11	5 × 12
6 × 1	6 × 2	6 × 3	6 × 4	6 × 5	6 × 6	6 × 7	6 × 8	6 × 9	6 × 10	6 × 11	6 × 12
7 × 1	7 × 2	7 × 3	7 × 4	7 × 5	7 × 6	7 × 7	7 × 8	7 × 9	7 × 10	7 × 11	7 × 12
8 × 1	8 × 2	8 × 3	8 × 4	8 × 5	8 × 6	8 × 7	8 × 8	8 × 9	8 × 10	8 × 11	8 × 12
9 × 1	9 × 2	9 × 3	9 × 4	9 × 5	9 × 6	9 × 7	9 × 8	9 × 9	9 × 10	9 × 11	9 × 12
10 × 1	10 × 2	10 × 3	10 × 4	10 × 5	10 × 6	10 × 7	10 × 8	10 × 9	10 × 10	10 × 11	10 × 12
11 × 1	11 × 2	11 × 3	11 × 4	11 × 5	11 × 6	11 × 7	11 × 8	11 × 9	11 × 10	11 × 11	11 × 12
12 × 1	12 × 2	12 × 3	12 × 4	12 × 5	12 × 6	12 × 7	12 × 8	12 × 9	12 × 10	12 × 11	12 × 12

Year and Term	Times Table Facts	Year and Term	Times Table Facts	Year and Term	Times Table Facts
Year 2 Term 1	2 x 2 3 x 2 4 x 2 5 x 2 6 x 2	**Year 3 Term 1**	2 x 3 3 x 3 4 x 3 5 x 3 6 x 3	**Year 4 Term 1**	2 x 6 3 x 6 4 x 6 5 x 6 6 x 6
Year 2 Term 2	7 x 2 8 x 2 9 x 2 11 x 2 12 x 2	**Year 3 Term 2**	7 x 3 8 x 3 9 x 3 11 x 3 12 x 3	**Year 4 Term 2**	7 x 6 8 x 6 9 x 6 11 x 6 12 x 6
Year 2 Term 3	2 x 5 3 x 5 4 x 5 5 x 5 6 x 5	**Year 3 Term 3**	2 x 4 3 x 4 4 x 4 5 x 4 6 x 4	**Year 4 Term 3**	2 x 7 3 x 7 4 x 7 5 x 7 6 x 7
Year 2 Term 4	7 x 5 8 x 5 9 x 5 11 x 5 12 x 5	**Year 3 Term 4**	7 x 4 8 x 4 9 x 4 11 x 4 12 x 4	**Year 4 Term 4**	7 x 7 8 x 7 9 x 7 11 x 7 12 x 7

Year 2 Term 5	2 x 10 3 x 10 4 x 10 5 x 10 6 x 10	**Year 3 Term 5**	2 x 8 3 x 8 4 x 8 5 x 8 6 x 8	**Year 4 Term 5**	2 x 9 3 x 9 4 x 9 5 x 9 6 x 9
Year 2 Term 6	7 x 10 8 x 10 9 x 10 11 x 10 12 x 10	**Year 3 Term 6**	7 x 8 8 x 8 9 x 8 11 x 8 12 x 8	**Year 4 Term 6**	7 x 9 8 x 9 9 x 9 11 x 9 12 x 9

Appendix B Lesson Template

Starter Task	Explore	Independent Learning			Review/Stretch
		Prove/Fluency	Apply	Challenge	
• Recap directly relevant prior learning. • Introduce a new topic by means of a model/ diagram/ representation • Pre-teach key vocab/ core learning needed for new learning	• Ping pong style learning. • Use of conceptual variation. • Skilful questioning by teacher and emphasis on oral use of mathematical language (stem sentences) • Short independent/paired WB or talk learning • AfL by CT and TA- immediate intervention	• Intelligent practice to draw out learning point • Procedural variation • Pictorial representations	• Test deeper understanding conceptual understanding. • Mathematical thinking	• Rich/sophisticated tasks that challenge understanding in new contexts and situations. • Same learning objective, deeper learning. • Higher order mathematical thinking	• Teacher addresses a common misconception- don't always wait until the end of the lesson. • Complete a challenge question as a class so all children experience challenge. • CT/TA completes immediate intervention .
• Concrete/Pictorial • Mathematical Vocabulary	• Accessing ideas • Small steps • Communicating concepts • Variation • CPA	Small steps Fluency Procedural variation Conceptual variation	Making connections Mathematical thinking	Chains of reasoning Applying maths to problems	Flexible- dependent on children and lesson
• TA sitting with targeted children with WB/pen/print out of slide/key vocab.	• TA sitting with targeted children with WB/pen/print out of slide/key vocab. • CT/TA busy checking understanding.	CT or TA working with small group with additional scaffolded learning. **All children can and will achieve.** CT and/or TA busy checking understanding and immediate intervention. CT or TA moving 'quick graspers' onto challenge *if* they have grasped understanding. Live marking.			CT or TA leading Review. CT or TA completing immediate intervention or challenge.

EYFS/KS1- busy time and guided groups

Coherence

Appendix C PoEs

Maths PoEs

All adults believe that children can and will achieve in maths.
We use the terms quick, middle and slower graspers. All children will grasp the maths.

Fluency

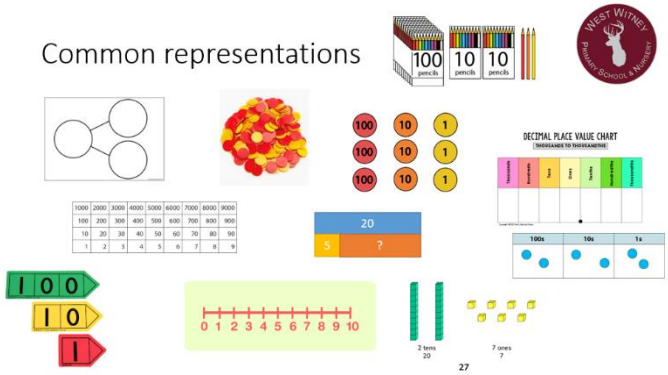
- Direct teaching of number facts
- CPA used to build understanding
- Regular recall and revisiting of year appropriate number facts
- Chanting in full sentences
- Use stem sentences to support children's vocabulary
- Focus on a small number of number facts at a time
- Predict difficulties- think pre-teaching to build confidence and allow all to access

Time Tables

- Daily times tables in Years 3 and 4
- Chanting in full sentences
- Weekly times tables testing in Year 3 and 4
- Practice times tables 3 times a week in Years 5 and 6

Representation and Structure

- Ensure that there is a clear rationale for using a particular manipulative or representation to teach a specific mathematical concept.
- A manipulative should enable a pupil to understand mathematics by illuminating the underlying general relationships, not just 'getting them to the right answer' to a specific problem.
- Manipulatives and representations can be used to support pupils of all ages. The decision to remove a manipulative should be made in response to the pupils' improved knowledge and understanding, not their age.
- Manipulatives should act as a 'scaffold', which can be removed once independence is achieved.
- Concrete- Pictorial- Abstract should be used regularly in all year groups
- A variety of representations are used to highlight the mathematical concept.
- Common representations



Mathematical thinking and Reasoning

- Pupils should actively engage in mathematical thinking in all lessons, communicating their ideas using precise mathematical language.
- Reasoning should be progressive
    - Step one: Describing: simply tells what they did.
    - Step two: Explaining: offers some reasons for what they did. These may or may not be correct. The argument may yet not hang together coherently.
    - Step three: Convincing: confident that their chain of reasoning is right and may use words such as, 'I reckon' or 'without doubt'. The underlying mathematical argument may or may not be accurate yet is likely to have more coherence and completeness than the explaining stage.
    - Step four: Justifying: a correct logical argument that has a complete chain of reasoning to it and uses words such as 'because', 'therefore', 'and so', 'that leads to'...

- Step five: Proving: a watertight argument that is mathematically sound, often based on generalisations and underlying structure.

- Stem sentences should be used regularly to scaffold children's ability to explain their learning.
- Stem sentences should be seen by children on the whiteboard or in books.
- Children are expected to answer questions in complete sentences.
- Children and staff are expected to use correct mathematical vocabulary. I say, we say, you say is used frequently.

Lesson Design

- Staff should structure their lessons on the agreed West Witney structure

Starter Task	Explore	Independent Learning			Review/Stretch
		Prove/Fluency	Apply	Challenge	
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		EYFS/KS1- busy time and guided groups			
• Concrete/Pictorial • Mathematical Vocabulary	• Accessing ideas • Small steps • Communicating concepts • Variation • CPA	Small steps Fluency Procedural variation Conceptual variation	Making connections Mathematical thinking	Chains of reasoning Applying maths to problems	Flexible- dependent on children and lesson
		Coherence			
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- In lessons, you would expect to see:
  - Small steps
  - Teaching whole class together
  - Ping pong teaching and learning
  - Carefully chosen representations, questions and tasks
  - CPA (Concrete, Pictorial, Abstract representations)
  - Opportunities for pupils to think, reason and problem solve
  - Articulating using correct maths vocabulary and speaking in full sentences
  - Secure number facts and fluency
- Lessons across the school should be:
  - Consistent enough that all children receive high quality education based on evidence and good practice.
  - Flexible enough that it could be tweaked to meet the needs of pupils in your class

Planning

- Use the NCETM Teacher Guidance as your planning
- PowerPoints are your planning so must be thought through
- KS1 and EYFS will need to use their planning pro forma so that enhanced provision can be planned for
- High quality resources are used- NCETM, I See.

Appendix D Video CPD

Mathematical thinking:

Math Solutions Number Talks K 1 Ten Frames and Dot Cards - YouTube

Representation and Structure

https://youtu.be/mbCshx2Vu4M

Fluency

A Year 3 lesson on multiplication | NCETM KS2

Number bonds to ten - YouTube KS1