

Our Vision for Mathematical Mastery at West Berry Federation



Our intent is to provide an ambitious, connected maths curriculum that challenges all children in every lesson. We want all children to develop a positive mind set towards maths and have the skills to embrace new learning. We want children to think deeply about maths and to develop an excitement and passion for the subject. We teach for a secure and deep understanding of mathematical concepts through small steps learning where concepts are regularly re-visited throughout the year.

The three aims of the National Curriculum are addressed every day (not just in the maths lesson) – **Fluency, Reasoning and Problem Solving.**

At West Berry Federation we use White Rose Maths resources (WRM) to support our maths teaching and learning.

EYFS

Children in nursery follow a holistic approach, whereby mathematical concepts are explored through child led play within both continuous and enhanced provision. Skilled practitioners observe children's interests and extend their mathematical thinking through open ended questioning and sustained thinking, following an 'in the moment' approach with each child's next steps firmly in mind. Mathematical skills and concepts are introduced through stories, songs and rhymes, alongside games and activities.

Reception

Children in reception have daily directed maths teaching, in which they learn through games and tasks using concrete manipulatives. Talking about maths is given high priority; children are invited to verbalise their thinking and guided in questioning that of their peers. Stem sentences and mathematical vocabulary are introduced and reinforced throughout the year.

Opportunities to rehearse and apply their learning is woven throughout the provision on offer. Children are given extended periods of time to meaningfully engage and supported to think deeply about their learning.

Lesson Planning

Where possible teachers teach both year groups in their class together. Where the two year groups are looking at very different objectives, then there are a number of options:

- 2 separate inputs to the lesson by the class teacher and the TA supports the year group working independently.
- The TA delivers the lesson to one year group and the teacher delivers the other year group's lesson.
- The teacher delivers one year group's lesson and the other year group watch the WRM video and are supported by the TA.

Learning is organised in a series of small steps. The small step approach means that formative assessment of previous steps is constantly used to inform planning. At the planning stage, teachers consider what scaffolding may be required for children who may struggle to grasp concepts in the lesson and suitable challenge questions for those who may grasp the concepts rapidly. This judgement is also based on the Purple Pen Question elicitation task that the children in Years 1-6 complete at the beginning of every lesson and repeat at the end of every maths lesson.. Each lesson focuses on one key conceptual idea and the children's learning is carefully planned across a unit of work in small steps. Connections are made across maths topics.

Classrooms

All classrooms have a maths working wall. This displays:

- The unit theme.
- The mathematical vocabulary (which is updated and referred to during the lesson).
- In Key Stage 2 the common, corrected Great Mistakes that have been made by the children (See Great Mistakes in Lesson Structure).
- The learning journey for that unit of work. This includes pictorial representations from each lesson as well as worked and labelled examples and any 'top tips' that the teacher may have covered during the input to the lesson.
- The stem sentences used during the lesson.
- On the working wall there is also a wonder wall where the children's mathematical questions are displayed so that other children can wonder and try and think about possible answers.

Lesson Structure

Lesson by lesson elicitation and application tasks - purple pen question - The purple pen question (PPQ) is a question or statement that links to the day's objective and the children need to think deeply about. They often require the children to prove and explain their thinking. The PPQ is introduced at the beginning of every lesson (a mini elicitation of children's existing knowledge) and referred to throughout the lesson so the children have time to form their answer and think about how they are going to represent it. In KS2, the children will answer their PPQ at the beginning of the lesson in pencil. The teacher will then check target children's answers to see if they have specific misconceptions or to see if they already have a deep understanding of the concept. Misconceptions can then be picked up on during the lesson. Children who have already provided a deep understanding of the PPQ will be extended throughout the lesson. The PPQ will normally be answered at the end of the lesson in purple pen but occasionally will be answered during the lesson or will be the activity for the lesson. Children that provided a deep answer at the beginning of the lesson are encouraged to 'prove' their mastery by explaining it to someone else, making up their own examples and non-examples, making links to other areas of maths and making use of the maths in new situations. In KS1, the PPQ is heavily guided by the teacher and may be recorded by the teacher or TA in the children's books. The expectation is that over the course of a week, each child will have their response to a PPQ recorded by an adult at least once in their book. In KS2, the children will complete 3 PPQs over the course of the week and the children are expected to record themselves and the teacher uses their explanation as a formative assessment tool when marking the work.

Fluency – Fluency is not just about remembering facts but is about developing a sense of number. Children are introduced to mathematical concepts through a range of concrete and pictorial representations. Classrooms are well equipped (see maths policy for a list of maths equipment to be found in each classroom.) Children are confident to use a range of manipulatives and pictorial representations and are able to use them to support, explain and extend their mathematical thinking. These will often be drawn in their books. A range of different representations are shown to the children so their thinking is not fixed on one representation e.g. right angles are shown in different shapes (both open and closed) and in different orientations. Children are encouraged to share their strategies and these are recorded on the board, by the teacher, along with the child's name. The children then decide on the most appropriate strategy for the task at hand. The use of mental methods versus written methods is always highlighted by the teacher and the children know that they look at the numbers carefully before deciding on which to use.

Fluency is also practised every day outside the maths lesson during a 10-15 minute session, 3 or more times a week. KS1 use Mastering Number and Key Stage 2 practise times table and associated facts, rapid recall of number facts and quick mental maths methods.

Conceptual variation - Children are presented with carefully chosen examples and non-examples. Children are given time to think and discuss with their classmates and the teacher supports the class to listen to each others' ideas, to agree and disagree and to improve until we reach a consensus.

Procedural variation – Children will be encouraged to focus on patterns and relationships between calculations. They will use one problem to work out the next. The teacher will facilitate this noticing by asking, 'What's the same?' and

'What's different? The concept can then be presented in a range of different ways such as missing box problems and changing the position of the equals sign in a calculation etc.

Questions - Teachers use questioning throughout every lesson to check understanding and to challenge thinking. A variety of questions are used such as:

Explain how you know? Why is that correct? Why is that incorrect? Can you prove it? Are you sure? What's the same/different about? Can you explain that? What does your partner think? What do you notice? Where have you seen this before? What do you already know about this?

Children are expected to listen to each other's responses and may be asked to explain someone else's ideas in their own words, or represent what is being explained or asked if they agree/disagree etc.

All responses are collected by the teacher and recorded on the board. Children are then given time to self-correct, notice mistakes and prove that their response was correct, before the correct answer is agreed upon.

Children are also encouraged to ask their own questions (these are recorded on the Wonder Wall – see classroom display).

Responses to questions are in full sentences using precise mathematical vocabulary (which is displayed on the working wall). Reasoning sentence starters are also displayed in every classroom.

Stem sentences are also modelled by teachers and are used by the children to help make sense of the structure of maths.

Reasoning and problem-solving – Staff facilitate mathematical thinking through their careful planning of open-ended, low threshold/high ceiling activities. They use the WRM worksheets to supplement this. Children who require extra scaffolding are guided through the reasoning and problem-solving by a teacher or TA and specific questions are chosen for the children to focus on, to allow for them to really explore and understand the questions.

Children use the language of reasoning (which is displayed in each classroom or in books) when talking about maths, challenging each other and the adults in their class as well as justifying their thinking.

Great mistakes (GM) - The children are encouraged to experiment with maths. As part of this, taking risks is encouraged and therefore mistakes are inevitable. GMs are celebrated and the children are encouraged to identify why the mistake was made, how they can learn from it and what they can do to overcome it. Some GMs are shared with groups or the whole class as a learning point for all children. Common GMs are recorded on the maths working wall. You may see GM written next to an incorrect answer in a child's book and the child will be expected to correct the mistake as well as explaining what they did wrong.

Maths books

For a short video on the layout of our maths books please follow the link.

https://drive.google.com/file/d/1r5xCwn_q85-Bg4mn8Fu1vvFtVIQI1tam/view

Marking - the marking policy for mathematics acknowledges the different style of teaching in maths. In KS2, children are expected to mark their own work in order to give them ownership of their work as well as to help them identify the reason for their errors. The marking policy requires that the PPQ is acknowledged by the teacher but only remarked upon if exceptional (this may also be shared with the class in a subsequent lesson) or if/when a teacher feels this is necessary to move learning forward. No arrow shows that the child needs more work on the objective before they can be considered to have understood it. A sideways arrow shows that the child is ready to move onto the next objective and an upwards arrow shows that the child has exceeded the lesson objective and needs to be challenged more in the next lesson. When a child has received extra support before the next lesson then this will be noted in their book.

Assessment - Teachers assess constantly through their use of questioning.

The PPQ is used as an assessment tool to see if the children can clearly explain their thinking on an objective. When time allows, children will peer assess their classmates PPQs and give written comments.

Teachers will mark children's work after every lesson and give feedback as necessary.

The WRM end of unit tests are administered at the end of each unit and the results are recorded and shared with Senior Management and parents.

In Years 3 and 4, there will be a mid-year and end of year Testbase maths assessment carried out and a scaled score will be generated.

In Years 5 and 6, practice SAT papers are completed in November and March and the Year 5s will sit a previous years SATs paper in May.

Oracy in maths lessons – In our classrooms, there is an expectation of mathematical talk. Children will answer in full answer sentences using sentence starters when necessary. The expectation is that there will be talk about the process of getting an answer before the answer is discussed. There will be choral repetition as well as stem sentences and mathematical vocabulary will be explicitly introduced to the children and then displayed on the Working Wall. Children will listen to each others answers as well as teacher explanations and use initiate, build and challenge hand gestures to engage with all parts of the lesson.

SEND pupils – Unless a child is working at a level which means they cannot access the learning in their year group, they will be taught as part of the main class maths lesson with various adjustments to support quality first teaching. Additional support may be given in the form of additional adult support (during the whole class input and independent work), increased use of concrete and pictorial representations or an increased focus on fluency in their independent work. They may also complete additional activities outside of the mathematics lesson such as a pre-teach session.

NB: We do not label our children. We have high expectations of all children and strongly believe that all children are equally able to learn mathematics. Some may take longer to grasp concepts and may need careful scaffolding or extra time/support (guided groups, same day catch-up, additional homework, pre-teaching, intervention groups etc), but when concepts are presented in the right way all children can learn.

Under-resourced pupils - Teachers have a focus on under-resourced children in their classrooms and barriers to learning are identified and overcome so that these children can make accelerated progress. When planning and delivering maths lessons, the needs of under-resourced children are always considered. Teachers and leaders carefully monitor the progress of these children.

October 2023

Useful links:

Ready to progress criteria with powerpoints for group activities. Exemplars of the key areas of the maths curriculum that children need to master for success in the next year group.

<https://www.ncetm.org.uk/classroom-resources/exemplification-of-ready-to-progress-criteria/>

Professional development materials for teacher subject knowledge. Useful for stem sentences and representations.

<https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/primary-mastery-professional-development/>

Mastery assessment materials. Useful for ideas for PPQs and also questions to extend children's understanding.

<https://www.ncetm.org.uk/classroom-resources/assessment-materials-primary/>

White Rose Education planning. Links to small steps as well as premium resources.

<https://whiteroseeducation.com/>

White Rose Education calculation policy including concrete resource lists for each year group.
[In the shared drive under Mathematics and then White Rose Maths Calculation Policy.](#)

I-see reasoning and I-see problem-solving resources for Key Stage 1, Lower Key Stage 2 and Upper Key Stage 2.
Excellent resources to really make children think about maths.
[In the shared drive under Mathematics and the I-see resources.](#)

Nrich. Full of investigations including low threshold / high ceiling tasks.
<https://nrich.maths.org/8769>
<https://nrich.maths.org/7701>