

Mathematics at St Osmund's Middle School

Curriculum Intent

Mathematics at St Osmunds is designed to create fluent, inspired mathematicians building on the ideas of maths mastery. Emphasis is placed on the 'language of maths' so that children can articulate what they already know in order to build upon it and find out what they need to know.

At St Osmunds, we want children to:

- Become fluent in the fundamentals of Mathematics
- Be able to reason mathematically
- Solve problems by applying their Mathematics

We are committed to ensuring that children are able to recognise the importance of Maths in the wider world and that they are also able to use their mathematical skills and knowledge confidently in their lives in a range of different contexts.

Maths is a journey and long-term goal, achieved through exploration, clarification, practice and application over time. At each stage of learning, children should be able to demonstrate a deep, conceptual understanding of the topic and be able to build on this over time.

There are 3 levels of learning:

- **Shallow learning:** surface, temporary, often lost
- **Deep learning:** it sticks, can be recalled and used
- **Deepest learning:** can be transferred and applied in different contexts

The deep and deepest levels are what we are aiming for by teaching maths using the Mastery approach.

We intend to do this by:

- Providing our children with a variety of mathematical opportunities, which will enable them to make the connections in learning needed to enjoy greater depth in learning.
- Ensuring our children have access to a high quality maths curriculum that is both challenging and enjoyable.
- Ensuring children are confident mathematicians who are not afraid to take risks.
- Fully develop independent learners with inquisitive minds who have secure mathematical foundations and an interest in self-improvement

Reflecting our school values of Faith, Community Hope and Love

We have high **hopes** for all children to achieve their full God-Given potential, feeling safe and secure in their environment to learn. We **hope** and strive for excellence across the curriculum, giving every pupil the opportunity to flourish and achieve their aspirations. We want to give children an overwhelming sense of belonging to our school **community**: building each other up, encouraging one another and supporting one another. Our students show **respect** towards one another and God's beautiful creation by being kind, caring and compassionate in word and action. Everyone feels valued as we show **love** to our neighbours. We know that every member of our community is a unique individual; we celebrate the diverse nature of our community and the wider world.

Mathematics is a subject built on the discovery of creative thinkers. We want all children to enjoy Mathematics and to experience success in the subject, with the ability to reason mathematically. We are committed to developing children's curiosity about the subject, as well as an appreciation of the beauty and power of Mathematics.

Curriculum Implementation

The content and principles underpinning the 2014 Mathematics curriculum and the Maths curriculum at St Osmunds Middle School reflect those advocated by the Mastery approach found in high-performing education systems internationally. These principles and features characterise this approach and convey how our curriculum is implemented:

- Teachers reinforce an expectation that all children are capable of achieving high standards in Mathematics.
- The large majority of children progress through the curriculum content at the same pace. Differentiation is achieved by emphasising deep knowledge and through individual support and intervention.
- Teaching is underpinned by methodical curriculum design and supported by carefully crafted lessons and resources to foster deep conceptual and procedural knowledge.
- Practice and consolidation play a central role. Carefully designed variation within this builds fluency and understanding of underlying mathematical concepts.
- Teachers use precise questioning in class to test conceptual and procedural knowledge and assess children regularly to identify those requiring additional support.

Equality of opportunity

The Mathematics curriculum is designed to be accessed by all learners regardless of prior attainment. At KS2, children are taught in mixed prior attainment classes. At KS3, children are taught in either a higher prior attainer class or mixed prior attainment classes. We believe that students should be supported at their point of need within the classroom and that having mixed prior attainment classes is essential at this age for the confidence of all learners.

Children who are needing additional help outside of the classroom have the opportunity to work with a TA or teacher during small group sessions. Pupil premium children who need extra support are seen first and, where possible, again before the end of the year. All PP children, regardless of prior attainment, will receive additional maths sessions with a tutor at some point during KS2 to challenge and stretch them. This is responding to research which shows that higher attaining PP children make less progress through to GCSE.

We provide for Prior Higher Attainers, or any children who are able to grasp the learning within the lesson rapidly, by: giving opportunities for children to explore concepts in more depth during the 'discovery' phase of the lesson; starting the children at different points in the independent work; and providing additional stretch activities if required.

Seating plans identify children with specific additional needs and Pupil Premium children. At St Osmunds we have a 'PP first' culture and teachers check in with these identified pupils in every lesson. We are beginning to also identify children with a lower reading age to allow teachers to quickly identify children who may need additional support with subject specific vocabulary, or accessing independent tasks.

School wide strategies are utilised to support those students who require additional support with literacy, attention, change and transition.

How do we support learners who struggle to retain vocabulary?

Vocabulary based knowledge organisers have proven to be a useful tool to help all students and chosen vocabulary is carefully displayed around classrooms. Both mediums utilise dual coding.

Vocabulary is explicitly taught using a range of techniques including pre teaching, over learning, visuals and associated actions. DNA tasks allow for daily retrieval of key vocabulary.

Staff are conscious of the range of vocabulary learners are exposed to and often rephrase questions as necessary to ensure that the meaning has been fully understood and that different words for the same mathematical concept are highlighted.

How do we support learners who need additional time and support to develop conceptual understanding?

- Use of pre-teaching to give some learners a head start.
- Use of clearly laid out worked examples for learners to refer to when working independently.
- Plan lessons using the concrete, pictorial, abstract method.
- Use intelligent variation of practise questions.
- Ensure tasks are scaffolded so that the learner can work on the planned objective; for example pre-write information that is non-essential to the learning so that the learner can focus on the skill being taught.
- Use representations learners are familiar with to transfer and connect similar ideas eg a tens frame used in Year 1 to show that ten ones is equal to one 10 could be used in Year 5 to show that ten tenths is equal to one.

How do we support students who lack confidence in their own mathematical ability?

- Use of intelligent variation of practise questions within lessons to build up the level of challenge slowly.
- Employ errorless learning strategies - start independent tasks with questions you know the learner has mastered. Early success builds confidence and resilience.
- An awareness of how the learner responds to praise.
- Address misconceptions but acknowledge the parts the learner has done correctly.

Curriculum coverage

To ensure curriculum coverage, pace and high expectations we use Power Maths (KS2) and White Rose Maths (KS3) to structure our Mathematics curriculum. Teachers use the year group appropriate objectives for all children unless a child is significantly behind age related expectations and on a separate learning passport / EHCP.

Planning

1. Long term: National Curriculum

2. Medium term: The use of Power Maths at KS2 and White Rose at KS3 to provide learners with small-step learning opportunities and to support teachers in planning.

3. Short term: -

Daily lessons are designed in parts: a fluency/ recall starter, a discovery task, sharing tasks and independent work.

Lesson Design

Maths talk and metacognition is a significant part of the lesson design.

	In Focus			Let's Learn	Guided Practice	Independent Practice
What is happening to enable mathematical thinking and metacognition?	Explore	Structured discussion (informed by or led by Let's Learn)	Journaling	Read & Reflect	Trying out, maths talk	Maths on your own
Point	Deep mathematical thinking at a relational level		Children capture and own their method/s	Compare the 'friends' in MNP's journaling with ours	Opportunity for teacher to assess children's mathematical understanding	Children independently apply their learning
CPA	Concrete			Pictorial	Abstract	
Children	Plain language Informal language Use manipulatives (expose and explore the mathematical structure) Cognitive freedom	Cognitive freedom to make links with their conceptual understanding		Be metacognitive - connect with what they know and how they know it	Check and balance Use and utilise their journaling	Work as independent mathematicians: 1) secure maths concepts 2) can figure out maths 3) can act metacognitively
Developmental continuum	Explore it (unstructured)			Talk it (structured)	Write it down	
Teacher	Acts as a catalyst for exploration Facilitates Has intent based on the concept	Open questions Ping-pong as ch_n are actively engaging with maths (manipulatives / calculating / drawing a bar model...) Small steps Layering understanding Embedded remediation Captures methods - on board No closed questions No answers No right or wrong		What do we know which will help here? What do I need to do? Why? What will help me?		Work with children needing additional scaffolding / catch up

As part of both the Power Maths at KS2 and White Rose at KS3, new concepts are shared within the context of an initial related problem, which children are able to discuss in partners. This initial problem-solving activity prompts discussion and reasoning, as well as promoting an awareness of maths in relatable real-life contexts that link to other areas of learning. Teachers use careful questions to draw out children's discussions and their reasoning. The class teacher then leads children through strategies for solving the problem, including those already discussed. Independent work provides the means for all children to develop their fluency further, before progressing to more complex related problems. Mathematical topics are taught in blocks, to enable the achievement of 'mastery' over time. Each block provides the means to achieve greater depth, with children grasping the concepts more rapidly being offered rich and sophisticated problems or investigative tasks within the lesson as appropriate. All areas are provided for the learning at KS2 by Power Maths, with teachers supplementing or adapting for the needs of the individual learners within the class.

Children are taught **metacognitive strategies** to approach their learning: children think about what strategies they may use to solve the task, drawing on mental, informal jotted, and formal methods. They are encouraged to use bar modelling or other graphic representation to expose the structure of the problem. They are required to draw on prior learning and make links to current learning. After they have finished a task (either independently or during partner talk / journaling time) children are given time to review their learning and assess if that strategy worked. If it did not, they identify where they went wrong and what they would do differently next time. This is recorded as feedback in their books.

White Rose is used as a basis for learning at KS3 and teachers use the same principles of lesson design when planning their KS3 lesson sequences as they use at KS2.

Concrete, pictorial, abstract

Concrete – children have the opportunity to use concrete objects and manipulatives to help them understand and explain what they are doing.

Pictorial – children then build on this concrete approach by using pictorial representations, which can then be used to reason and solve problems.

Abstract – With the foundations firmly laid, children can move to an abstract approach using numbers and key concepts with confidence.

Objects, pictures, words, numbers and symbols are everywhere. The mastery approach incorporates all of these to help children explore and demonstrate mathematical ideas, enrich their learning experience and deepen understanding. Together, these elements help cement knowledge so pupils truly understand what they've learnt.

All pupils, when introduced to a key new concept, should have the opportunity to build competency in this topic by taking this approach. Pupils are encouraged to physically represent mathematical concepts. Objects and pictures are used to demonstrate and visualise abstract ideas, alongside numbers and symbols.

Teaching

'Quality first teaching' linked to teaching standards:

All teachers:

1. 'Know where their children are' through the use of concise summative assessment, prior learning, assessment, maths talk
2. 'Understand where their children need to be' through a secure understanding of year group expectations and/or pre key stage expectations and incisive, ongoing, formative assessment
3. 'Know how they are going to get them there' through the use of a range of strategies to promote independence, mastery and high expectations of ALL.
4. Effectively deploy adults, specifically during introductions, plenaries & catch-up sessions
5. Plan for progression during and between lessons.

Assessment

1. Summative/ diagnostic (where necessary) – White Rose, Power Maths, GL tests, past SATs papers, CAT tests.
2. Formative / ongoing
3. Prior & Post learning – informs future planning, demonstrates progress in books, celebrates effort and achievement.

Curriculum Impact

We expect the impact of our curriculum design to be:

- Children will have quick recall of facts and procedures
- Children demonstrate a quick recall of facts and procedures. This includes the recollection of the times table.
- Children show confidence in believing that they will achieve.
- Child achieve objectives (expected standard) for year group.
- Children have the flexibility and fluidity to move between different contexts and representations of maths.
- Children develop the ability to recognise relationships and make connections in maths lessons.
- Children master mathematical concepts or skills and can show it in multiple ways, using the mathematical language to explain their ideas and independently applying the concept to new problems in unfamiliar situations.
- Children show a high level of pride in the presentation and understanding of the work

Ensuring student progression

We have one prior higher attainer class and two mixed prior attainment in each year half in KS3. The impact of this move has been increased engagement in lesson for our prior lower attainers. Where possible, the same teacher will teach a class for two years to make the most of the relationships built up - we believe relationships with the children, including our understanding of each individuals needs, is crucial to build on what a child can already do to ensure progression.

Additional opportunities to learn

There are a variety of additional opportunities to learn, particularly at KS3.

Junior Maths Challenge - Year 7 and Year 8 (Leading to further competition stages)

Maths Team Challenge at Thomas Hardy School - Years 7 and Year 8

Opportunities for students to apply for a place attending interactive lectures at Exeter School of Mathematics which would run from Year 8 to Year 11.

Other challenge / Stem events via Smallpiece Trust or links with parents. - all years

Possible Questions

1. How does your department plan for progression?

Use of the PowerMaths and White Rose resources.

2. How do you ensure students are challenged?

Challenge is within each lesson at every level. Children are encouraged to work 'at the point of difficulty' so that challenge is not a 'bolt on' to the lesson.

3. What rationale does your department have for the order in which content is being taught?

Following the order from Power Maths and White Rose to ensure pitch and pace are consistent across the school and DASP.

4. How does the department develop students' written work?

Daily journaling ensure children are writing in Mathematics lessons. Expectations for presentation, spelling and sentence structure are the same as for other subjects. Knowledge Organisers are vocabulary based as used to reinforce correct technical vocabulary as well as spelling.

5. How do you ensure that key content is remembered over time?

Each lesson begins with four questions taken from previous units of work. Regular revisiting supports the retention of key skills.

6. What is the rationale for your assessment approach?

Summative assessments (one each term) are used: Power Maths assessments and modified SATs papers in year 5, SATs papers in Year 6 and White Rose assessments in KS3.

Assessment for learning in lessons ensure that children are being taught at their own level and moved on quickly. Teacher questioning is key.

7. How does your department ensure there are high expectations for students?

Power Maths and White Rose ensure a high pitch for all. Regular meeting to discuss classes and support for individuals mean that children are all encouraged to work at the 'point of difficulty'.

8. In what ways is the quality of the curriculum assured?

Individual feedback after learning walks and book scrutiny highlight good practice and generate individual targets. Subject area meetings are used to discuss pedagogy and to share good practice. Careful moderating of assessment tasks using baseline data will help to identify any inequalities in reaching curricular goals.

9. How do you support inexperienced and non-specialist staff?

Inexperience and non-specialists would have more frequent support from subject lead. Where appropriate, teachers work in collaboration with subject lead or other leading teachers (e.g. Phil Eadie from THS). A high level of commitment to the subject has lead some staff to seek additional training and qualifications through Teacher Subject Specialist Training courses in teaching secondary maths, where maths was not their trained subject.