



Primary Mathematics Guidance 2018-2019

Reviewed: M. Phelan (Trust Maths Lead) 21st August 2018

To be reviewed: Aug 2019 TGSA Academy Trust



Mathematics Aims

What is mathematics and why is it important?

Mathematics is the most creative subject and one all children should enjoy. Mathematics helps us to make sense of our world. It is a powerful, universal language used to explain, predict and represent events and tackle everyday problems. Mathematics is of central importance to our modern society. It is an essential part of everyone's daily life and critical to science, technology, finance and engineering. Mathematics is necessary for any employment or independent life.

At TGSA we aim not only to prepare our children for the next stage of their education, but also to lay the foundations for successful lives after school. Our aim is to prepare our children for the jobs of tomorrow, which will require greater mathematical skills than in the past, including thinking mathematically in order to use technology that doesn't yet exist.

The aims of our maths teaching at Tudor Grange Samworth Academy are aligned with the aims of the National Curriculum:

- **Fluency, reasoning and problem solving** – both in the mathematics lesson and across the curriculum. We recognise that pupils need to learn basic number facts and acquire **fluency in procedures**, alongside **developing conceptual understanding** if they are to be able to solve increasingly complex problems in life and later in the workplace.
- A **mastery approach** to the teaching of mathematics has been adopted, so we have high expectations of all our pupils. We endeavour to make the mathematics curriculum accessible to all pupils; moving them through the programme of study at broadly the same pace. All children need a deep understanding of the mathematics they are learning in order that future learning is built upon firm foundations. As we pursue this mastery approach we are moving away from separate intervention groups, instead introducing same day 'catch up' sessions and additional practice to prevent children falling behind.
- Part of this approach includes adopting a '**growth mindset**'. Children at TGSA are encouraged to believe they are all capable of learning and doing mathematics, given sufficient time, good teaching, appropriate resources and effort.



There are aspects of mathematics teaching which will be seen in every classroom at TGSA:

- A positive attitude toward and sense of excitement about mathematics
- Children learn through active enquiry and experiment using concrete materials, represent their mathematical ideas through images and follow a clear progression toward recording abstractly
- Children learn to use multiple representations
- Mathematical skills are practised and applied across the curriculum
- A mathematically rich environment supports learning
- Communication, using precise mathematical language is supported
- Independence is encouraged
- Fluency and flexibility features strongly in every lesson
- Adults use skilful questioning to reveal, probe and address misconceptions
- Children who grasp concepts rapidly are challenged through rich and sophisticated problems
- Scaffolding is provided for children when required
- Skilful assessment identifies children who are struggling to grasp concepts leading to guided groups and catch up sessions with qualified teachers

Areas that should be seen through a Lesson Observation:

Based on the 5 big ideas

Key concepts of a Mastery lesson

- Breaking learning down into small steps and then drawing together in the form of conclusions and mathematical generalities
- Slowing the pace down, but going more deeply into each concept
- Focusing on how answers to questions are arrived at more than what the answers are
- Teacher's precise use of mathematical language, and expecting children to do likewise
- Exploring different methods of tackling calculations and questions
- Getting children to explain and discuss their methods and the identification of the most efficient strategies
- The importance of being number fluent



Planning

- We believe that the key to success with all learners is quality first teaching. This is promoted through ongoing bespoke professional development from specialist teachers (maths specialists, teacher coach).
- Objectives are taken from the relevant year band overview and medium term plans. These objectives enable progression in learning towards National Curriculum level descriptors.
- Teacher in KS1 plan together, while in KS2 there are Maths Specialists in each year group. Detailed medium term plans are provided, along with guidance on calculations.
- Planning must always be guided by sound *Assessment for Learning* strategies.
- Weekly lesson plans are completed using the format as outlined in the **'Typicality of a Lesson'** guidance.
- Mathematics in the Foundation Stage is a practical, activity-based subject both indoors and outdoors. Each lesson in every year group is focussed around the concrete (model) – pictorial (image) – abstract approach as children learn new concepts. Teachers skilfully highlight connections between mathematical topics and support the learning of mathematical vocabulary.
- The school follows the structure of Maths No Problem and its full implementation is being trailed in both Years 1 and 5 for this academic year. Teachers have access to a wide range of resources (including text books, NCETM material, White Rose schemes of work, practical resources, games and software).

Lesson Structure/Role of the Teacher/Teaching Assistant

Lessons are structured around the concrete – pictorial – abstract approach providing opportunities throughout for using mathematical vocabulary, developing mathematical thinking and using multiple representations. There should be opportunities to record in every lesson (in different ways).

The main teaching activity should be whole-class based with everyone covering the same content. Children are generally taught in classes, not setting groups in line with the mastery approach. Guided groups and catch up sessions are led by qualified teachers/ Associate teachers, whilst teaching assistants may circulate during the main part of the lesson, or take the lead on some whole class activities.

Lessons are structured with assessment opportunities throughout, these may be referred to as mini-plenaries. This provides opportunities to evaluate what has been learnt, review success criteria and address misconceptions. It should also provide opportunity for peer/self-assessment so children understand what they attained and where to go next. There are no specific time limits for the different parts of a lesson or a pre-determined format. See the assessment policy for more guidance on this.



The aim of a mathematics lesson is to teach a child a skill or strategy that will provide a solution to a task. It is not simply to produce a page of correct number work, which is abstract to any real life situation. To support this approach we use the NCETM Assessment material to support pupils working at Mastery or Greater Depth along with formative tracking using Insight. **We do not erase incorrect answers or approaches** as they provide a valuable clue to the path a child is taking and becomes valuable informal assessment. Although maths is taught as a discrete subject, staff are encouraged to exploit any cross-curricular links and provide opportunities for children to demonstrate their mastery of concepts or skills in other subjects (eg: science, ICT, PE, topic).

It is the responsibility of teaching assistants supporting individuals or groups of children within a maths lesson **to ensure they have read, and if required, discussed the planning** with the class teacher and prepared any required resources. They are expected to provide feedback to the teacher on a daily basis for the children they have been working with. This feedback may be verbal or if preferred, written on their copy of the maths plan or on 'post-it' notes.

Learning in books is presented and marked in accordance with guidance in the staff handbook/assessment book.

Classroom Environment

The classroom environment should be mathematically rich and support current learning.

Maths working walls should be interactive, clearly visible and provide the children with key vocabulary, number lines and charts, 100 squares, number facts, prompts and challenges appropriate to the age/stage and linked to current learning. Learning mats, maths dictionaries and a range of concrete materials should be available for every child.

Homework

Appropriate homework activities are set for each year group. From Y1 homework is set once a week, given out on a Friday and returned and marked with the children by Wednesday. Teachers will also set other homework tasks, which may be games to play, facts to learn, or paper based questions to answer and return. There are additional homework activities available in the Maths area of the school website for pupils/staff and parents to access.

Family Partnerships

It is vital that parents and carers are actively involved in their children's learning. Maths Workshops take place throughout the year for each class. During these workshops, parents have an opportunity to work with their children on fun, purposeful maths activities that can be extended into the home. Each workshop is planned and delivered by their children's teacher in collaboration with the maths leader. We also provide a range of homework clubs, maths homework help, regular maths newsletters and personal contact with the maths leader.



Resources



Each class/year group has a range of general mathematical equipment (eg: dictionaries, base ten, dice, counting sticks, Numicon, Cuisenaire, etc). A wide range of additional resources are available in the maths stores both upstairs and downstairs in the lead Maths teacher's room.

Class computers have access to maths software for the interactive whiteboards. A further range of software is used, which teachers should be familiar with. Recommended websites are listed on the school website TGSA Academy Trust and shared with staff via email updates. There are additional resources via the 'Education City' and 'Maths with Parents' website to support teachers during lessons via the interactive whiteboard and for homework and assessment activities.

Throughout the year additional activities are organised to raise the profile of maths within the school and children's enjoyment of this area; these may include visitors to promote maths skills and maths trails and challenges in collaboration with other schools.

Equal Opportunities

The provision of maths teaching is regardless of race or gender and should allow all children to reach their full potential. In order to achieve this, activities should be set in a familiar context where possible. Children with special educational needs should be taught on an individual/small group basis when applicable (as guided by SENCO).

Record Keeping/ Assessment

Maths books provide evidence of progress, along with annotated planning. Learning should be recorded in as many ways as possible to provide the child with a range of experiences. Assessment is an ongoing process in the classroom which forms the basis of future action. Formal (summative) and informal (low stakes/formative) teacher assessments are based upon the practical, written and oral work completed by the children.

Summative assessment: there will be a baseline, CA1, CA2 and CA3 to monitor progress and attainment levels that take place termly and written tests are analysed in order to support end of year assessment judgements.

Each child should be involved in the review of his/her progress and be able to contribute to discussions about different aspects of his/her work.

Special Educational Needs/Rapid Graspers

We aim to provide a rich mathematical education, which will develop the potential of all pupils. Any child who is assessed to have special education needs in mathematics will have a maths target on an EHCP and be placed on the school's SEND register.

Children who regularly grasp concepts rapidly and have been assessed as having mastered objectives from their year group may be identified as a Rapid Grasper. Planning for these pupils will focus on enrichment prior to acceleration and the development of mathematical thinking rather than covering content more quickly through greater depth activities.

Various enrichment activities are organised throughout the year for these pupils in addition to the daily mathematics lesson.



Lesson Typicality

1) Making Connections

- *Practice and Variation of key basic arithmetic skills leading to fluency (ability to manipulate and make connections).*

2) Review of previous learning objectives within unit

- *AFL- marking & feedback to address recap of key concepts, common misconceptions from previous day(s) learning.*

3) New Learning

- *Contextualised word problem requiring a degree of reasoning*
- *Explore what the question is asking and the structure*
- *Derive how to solve the problem and skills needed*

4) Practice new learning

- *Show me, prove it, draw it, what have you derived?*

5) Apply new learning/ Challenge tasks

- *Independent task moving towards Mastery, 'Going Deeper' for rapid graspers or additional support for pupils who require it.*
- *Using the NCETM assessment / White Rose teaching guidance material to deepen learning and also to move pupils to Greater Depth.*

Coherence

Connecting new ideas to concepts that have already been understood, and ensuring that, once understood and mastered, new ideas are used again in next steps of learning,

What might this look like in practice?

- Teacher explicitly links new learning to prior learning – often at the beginning and the end of the lesson
- The learning is broken into small, carefully sequenced steps
- Each lesson focuses on one point, in depth so that learning is sustainable.

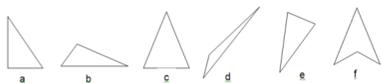
Variation

The central idea of teaching with variation is to highlight the essential features of a concept or idea through varying the non-essential features.

When giving examples of a concept, it is useful to add variation to emphasise:

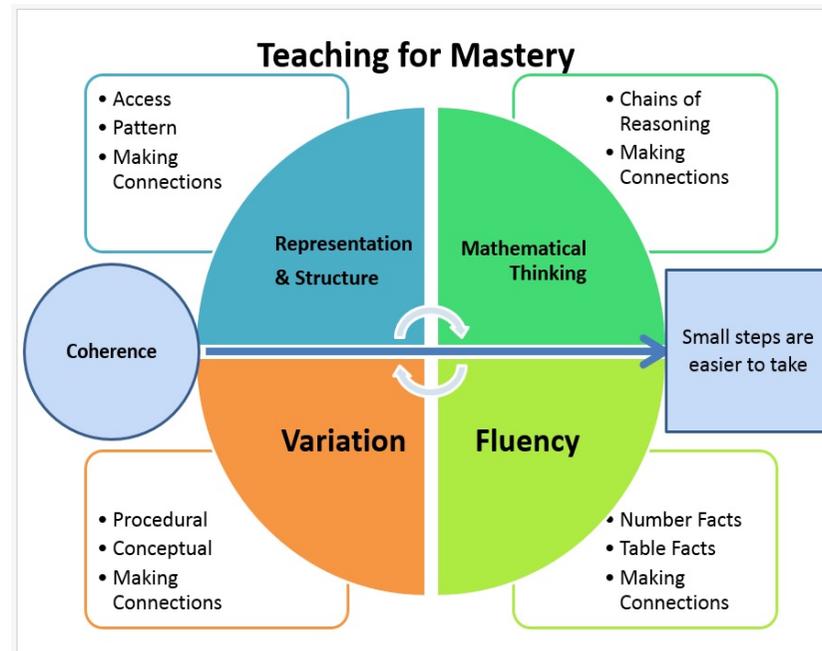
- What it is (as varied as possible);
- What it is not.

When constructing a set of activities / questions it is important to consider what connects the examples; what mathematical structures are being highlighted?



To get a sense of what a triangle is learners need to see examples of triangles which show all aspects being varied (length of sides, angles, orientation). If most triangles are shown with one side as a horizontal base and the vertex pointing upwards (as in a, b and c), this feature might be over-generalised and pupils might think that d or e are not triangles. It is also important to give non-examples, as in f and to discuss why this is not a triangle.

Lesson observation discussions



Mathematical Thinking

If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the student: thought about, reasoned with and discussed with others.

What might this look like in practice?

- Adults ask questions that require children to reason, 'What is the same? What is different?'
- Adults ask pupils to explain, convince, draw diagrams or use manipulatives to illustrate an idea or strategy, reason and conjecture as a natural part of all activity in the mathematics classroom. This further supports deep and sustainable learning.

Fluency

Fluency demands more of learners than memorisation of a single procedure or collection of facts. It encompasses a mixture of efficiency, accuracy and flexibility.

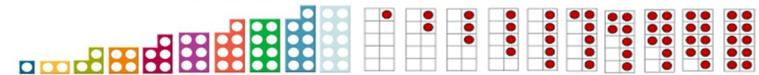
Quick and efficient recall of facts and procedures is important in order for learners' to keep track of problems, think strategically and solve problems.

Fluency also demands the flexibility to move between different contexts and representations of mathematics, to recognise relationships and make connections and to make appropriate choices from a whole toolkit of methods, strategies and approaches.

Representation and Structure

Representations used in lessons expose the mathematical structure being taught, the aim being that students can do the maths without recourse to the representation.

Here are two representations for numbers within 10; the tens frame and Numicon:



Both are very helpful concrete and pictorial representations of number but they are representing different structures. The tens frame is drawing attention to the '5 and a bit' structure of numbers, whereas Numicon draws attention to the odd/even structure. Both images support seeing the complement to 10. The two images of 6, for example give different (equally important) ways of thinking about the structure of 6 which in turn influence that ways the children might transform, compare and combine numbers when calculating.