Teacher Subject Specialism Training in Mathematics (TSST Maths) with Denbigh TSA

Introduction

Denbigh TSA's TSST course aims to support non-specialist teachers in becoming confident and effective teachers of Mathematics for learners of all abilities up to and including GCSE standard. The course aims are:

- To identify the strengths and gaps in teachers' subject knowledge so that a personalised provision can be provided to meet their needs
- To develop teachers' subject and curriculum knowledge up to new GCSE specification standard
- To develop teachers' pedagogical skills so that they become effective Mathematics classroom practitioners

The course will be divided into 6 modules which will be delivered by Senior Maths teachers from Denbigh TSA/ Enigma Maths hub. Sessions will cover mathematical knowledge linked to the module focus as well as the pedagogical skills needed to deliver the mathematical concepts effectively. In addition, a bank of videos will be available showing these teachers modelling the teaching of 'difficult to teach' concepts which teachers can refer to as needed. For the duration of the TSST programme, participants will also have to be able to attend courses run by the Enigma Maths hub, at no cost. The course takes 1 year to complete with two entry points in October and February.

In order to support and ensure that learning from the sessions becomes embedded in participants' practice, home schools will be expected to provide mentor support to participants. They will be asked to observe the participant teaching maths and give feedback, meet with them to discuss lesson planning and monitor their ongoing progress. Returning teachers will be supported by a partner school (in a similar way to a teacher trainee). The time allocated for mentoring will be negotiated between the participant, home school and Denbigh TSA, depending on the participants' level of mathematical knowledge and teaching experience.

Course structure

Upon acceptance onto the course, teachers will be asked to complete 2 x 1 hour baseline test papers. These will cover key mathematical concepts to assess subject knowledge, and common mathematical misconceptions to assess their understanding of the ways in which students learn Mathematics. These diagnostic tests will be marked by the teaching school and used to inform personalised provision for each teacher. They will inform discussions about the modules to be completed and the level of mentor support required.

Subject knowledge and pedagogy sessions.

The concepts of Maths have been divided into 6 key topics. They will be co-facilitated with participants dividing into smaller groups at points during the session so that they can focus on the key topics at either foundation or advance level, according to need.

All sessions will take place from 9.00 -3.00 p.m. at Denbigh School.

Module	Module Summary	Outline Contents
1. Maths Mastery	We are all aware of the difficulties in teaching maths so that students retain the information they are given. This module will look at the idea of working memory and how to work with this to allow students to master the essential knowledge they need.	Consideration of common problems students face Development of idea of working memory and how this impacts on retention Consideration of 3 key requirements in maths teaching: • Teach fewer concepts over more time • Separate minimally different concepts • Build automaticity These 3 aspects will be considered in the light of individual lessons, series of lessons and schemes of work.
2. Number Work	Modules 2 – 6 are intended to address two issues: 1. The basic knowledge that students need for the new GCSE. Clearly it will not be possible to cover all content, but those aspects which are central to an overall understanding will be covered. 2. Approaches to teaching these central aspects, highlighting common student misconceptions and how to address them and common problems in answering exam questions	1. Considering Level 1 to 9 content and new topics • Venn diagrams • Product rule for counting 2. Each topic below will consist of introduction to the content, including the start point (level 1) and end point (level 9 or highest); methods of teaching those topics which cause the major problems; common misconceptions and errors and how to address them • Working with fractions, decimals and percentages • Working with number types • Working with powers and roots • Application of number work to finance problems

3. Ratio & Proportion	Each module will look at some aspects of the content, identifying any new content and its links with existing content. Reminders of what students need to know through practice will be an important part of each module. There will also be chance to consider alternative ways of teaching and their advantages and disadvantages.	1. Considering Level 1 to 9 content and new topics • Increased focus on ratio and proportion • Topics now being taught in Foundation 2. Each topic below will consist of introduction to the content, including the start point (level 1) and end point (level 9 or highest); methods of teaching those topics which cause the major problems; common misconceptions and errors and how to address them • Types of ratio problem • Relationship to proportion problems • Direct and Inverse proportion • Focus on ratio/proportion problems
4. Algebra		1. Considering Level 1 to 9 content and new topics • Introduction of Functions • Venn diagrams • Areas under curves • Rates of change 2. Each topic below will consist of introduction to the content, including the start point (level 1) and end point (level 9 or highest); methods of teaching those topics which cause the major problems; common misconceptions and errors and how to address them • Manipulating algebraic expressions • Solving equations • Simultaneous equations • Inequalities • Manipulating quadratics • Graphs and links to other aspects of algebra
5. Statistics and Probability		1. Considering Level 1 to 9 content and new topics

		• Conditional Probability • Moving averages 2. Each topic below will consist of introduction to the content, including the start point (level 1) and end point (level 9 or highest); methods of teaching those topics which cause the major problems; common misconceptions and errors and how to address them • Averages • Histograms • Cumulative Frequency • Time series • AND/OR Rules , tree diagrams and probability problems
6. Geometry		1. Considering Level 1 to 9 content and new topics • Shift of Trigonometry to Foundation • Shift of Vectors to Foundation 2. Each topic below will consist of introduction to the content, including the start point (level 1) and end point (level 9 or highest); methods of teaching those topics which cause the major problems; common misconceptions and errors and how to address them • Compound measures • Bearings • Congruence and similarity • Pythagoras and Trigonometry – 2D and 3D

To complete the course, participants will be expected to complete the first module (Maths Mastery) and 4 further modules, although we would encourage participants to take advantage of as many of the modules as possible.

Masters level credits

Optionally, participants can undertake a 30 credit Subject knowledge and curriculum development module of the Masters in Teaching and Learning offered by Denbigh TSA in partnership with Birmingham City University. The research is practice-based, building upon learning through the taught sessions and experiences in the classroom.

The module covers:

- Breadth and depth of content subject knowledge, in terms of the body of knowledge and skills in the subject,

- Pedagogical content knowledge, in terms of ways in which the teacher breaks down and communicates knowledge and skills to make them accessible to learners.

- Statutory requirements, national curricula and examination frameworks; development of qualifications and associated schemes of work.

- How subjects are evolving and why, including in line with the most recent trends and practice in corresponding business and employment sectors.

- Assessment in the subject(s) and tailoring teaching and learning appropriately to take account of it.

- The curriculum as the entire planned learning experience, including formal and informal areas of learning.

- Curriculum design including: entitlement; principles, values and attitudes; knowledge, understanding, skills; links between subjects and cross-curricular dimensions; learning in wider contexts beyond the classroom.

- Planning progression for all learners, including learners with SEN and disability and higher attainers; learners' common misconceptions in the subject(s) and how to address them

Assessment and certification

Participants will be assessed during half-termly lesson observations completed in lessons showing the range of age and ability across the academic year. These lesson observations are completed by the subject mentor from the home school.

For successful completion of the course At least 3 lesson observations must be judged to be good, including 2 from the final term of the course.

At the end of the course, the baseline testing process will be repeated to evaluate the levels of subject knowledge developed during the course.

Certification will be through the Denbigh Teaching School Alliance and will cite the modules covered as part of the course.

Entry criteria

- GCSE Maths Grade C or above
- Degree level qualification
- QTS (unqualified teachers will be considered if they can demonstrate significant experience of teaching and taking responsibility for whole class teaching in Maths or Maths related subjects. This course is not aimed at TAs or to be completed instead of a teacher training qualification)