



**Spring 2015**

**North West  
Regional**

**NEWSLETTER**

## Promoting Participation

**Increasing participation in AS and A level Mathematics and Further Mathematics is a key priority for the FMSP. The Maths Hubs are also focusing on strategies to tackle this issue with support from the FMSP. In 2012-13, of the students taking A levels, 26% took A level Mathematics (36% for boys and 18% for girls). For Further Mathematics the proportions are much lower at 3.8% of the students taking A levels (6.5% for boys and 1.8% for girls).**

### **IN THIS ISSUE:**

Professional  
Development

Encouraging  
Mathematics

Taking Maths Further

Year 12 and 13  
Problem Solving

Other News and  
Events: More  
Enrichment!

The FMSP has a well-deserved reputation for providing high quality professional development and resources to enhance the teaching of mathematics at A level. However, we are aware that the nurturing of student interest and positive attitudes to the learning of mathematics begins at a younger age. Over recent years the FMSP has broadened the range of support it provides for teachers of GCSE Mathematics and increased the number of enrichment activities which promote the continued study of mathematics to AS and A level.

The new Mathematics GCSE includes challenging assessment objectives, placing greater emphasis on reasoning, problem-solving and modelling. There is additional content to stretch students of all abilities and the content of the higher tier should provide students with a strong foundation to progress on to A level study. Exposing KS4 students to more challenging mathematical ideas and techniques helps build the confidence to take Mathematics to A level. This is particularly important in encouraging girls to opt for maths.

Over the past three years, the FMSP has been promoting the development of mathematical problem-solving skills through our CPD courses, competitions and teaching resources.

Free resources for developing problem-solving in KS4 are available on the FMSP website:

[www.furthermaths.org.uk/gcse](http://www.furthermaths.org.uk/gcse).

In February and March the FMSP has organised over 70 Maths Feasts. These half-day enrichment events are for teams of year 10 students, tackling stimulating and interesting mathematical challenges. The materials from this and previous years' competitions are available on the FMSP website:

[www.furthermaths.org.uk/y10tmc-materials](http://www.furthermaths.org.uk/y10tmc-materials).

The FMSP KS4 Extension and Enrichment courses have so far provided professional development for over 900 teachers. These two-day courses combine the development of pedagogy and discussions of key issues. From May 2015 a new programme of one-day CPD courses will focus on the new Higher Tier content of GCSE Mathematics, encouraging participants to look at ways to make links between GCSE and A level Mathematics in order to encourage progression. For more details: [www.furthermaths.org.uk/gcse-higher](http://www.furthermaths.org.uk/gcse-higher).

*Kevin Lord, FMSP Programme  
Leader*

# Regional Events and Updates

## Professional Development and Encouraging Mathematics

The North-West continues to provide a wide range of Professional Development events for teachers. We try to offer as many events as possible, a large number of which are either free or at a subsidised rate. Many of our days are targeted at specific groups of schools, for example, we run a number of training events that would be of particular interest to 11-16 schools. Some recent CPD events are outlined below:

### Post-16

For post -16 teachers we have developed a number of training days to support the teaching of a range of A Level modules. We started the year with our 'Introduction to Further Maths' events, which gave teachers the opportunity to discuss issues surrounding offering Further Mathematics as well as looking at a few of the curriculum topics in more detail.

The Applied Mathematics days **Teaching M1/S1/D1** are always popular. Teachers can choose to attend a full day event, with the focus on subject knowledge enhancement in the morning, or just the afternoon where the focus is on resources and ideas to enhance the teaching of the module. The morning sessions are designed to build confidence in the subject material but still highlight interesting resources and teaching ideas with plenty of chance for discussion and questions. This is particularly useful for teachers who are new to a module. The afternoon sessions can be attended as a free Teachers' Meeting and in general these include practical hands on resources, problem solving, questions based on real-life contexts and active learning resources.

We plan to run days covering the content of the A level Core modules later in the year. If you have any specific training requests please let us know.

### Key Stage 4

In the northwest we have successfully run several two-day **Extension and Enrichment** courses. In addition to these we have also held **Problem Solving in GCSE Mathematics** courses in various locations across the region. The aims of these courses are to provide teachers with strategies to address the problem solving assessment objectives at GCSE, to encourage the use of problem solving activities in Key Stage 4 mathematics classrooms and to explore a range of problem solving materials.

### Encouraging Mathematics

In December 2014, 100 students from Years 11-13 visited Lancaster University's campus for the 3rd annual **Florence Nightingale Day**. The enrichment event, named after the pioneering statistician (better known these days as a nurse, of course!), was organised by Dr Nadia Mazza of Lancaster's Department of Mathematics and Statistics with the support of the FMSP. The aim was to enthuse students, especially girls, with the possibilities offered by a career in mathematics, showcase successful women in mathematics at various stages of their careers and stimulate informal discussion between pupils and mathematicians.

Attendees were treated to three speakers:

- Prof Caroline Series from Warwick University opened with a tale of geometry and complex numbers, "Indra's Pearls".
- Dr Ron Knott from Surrey University who gave a talk on vegetables, the Fibonacci numbers and the golden ratio.
- Dr Katie Steckles from Think Maths wowed the audience with a look at some unsolved problems



In between speakers, students were given the chance to test their mathematical skills with their peers in other schools via a (very hard!) quiz. Students worked in small groups, assisted by a Lancaster PhD student acting as mentor. The results were seriously impressive, with everyone scoring at least half marks. A sample question:

"Charlie wants to cut the pattern of an unfolded cube out of a square piece of cardboard of side length 120cm. What is the maximum side length of the cube he can get? Give your answer to the nearest centimetre."

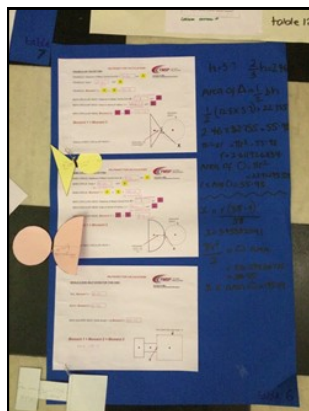
# Regional Events and Updates

## Enrichment for Students

One of the aims of the FMSP is to increase the number of students, especially girls, doing A Level Maths. With this in mind we offer a number of different opportunities for enrichment and extension.

### Taking Maths Further

In December, Manchester and Liverpool Universities held the popular **Taking Maths Further** events aimed at able Year 11 students who are considering taking A Level Mathematics/Further Mathematics. In addition, having only female speakers, we encouraged schools to consider bringing female students to the event in Manchester. Students got a taster of A Level Mathematics, including an insight into the workings of the Amazon shop floor. They also designed some great fish mobiles that made it through the quality control! The days concluded with a talk by Katie Steckles on 'Maths in the Simpsons' and a Dragon Maths quiz.



*Above and left: Students designing fish mobiles and producing posters of their results*

We are already looking forward to our **Mathamagic** enrichment days for Year 10 students in the summer which will follow a similar format. For further details:

[www.furthermaths.org.uk/NW\\_enrichment](http://www.furthermaths.org.uk/NW_enrichment)

### Year 12 and 13 Problem Solving

For sixth form students, we offer a series of six events spread across two years. We call these **Problem-Solving Conferences**, because in addition to providing a wealth of engaging problems and problem-solving contexts, we are also helping students to understand some of the strategies they use to solve problems. We particularly emphasise the importance of working collaboratively. Ultimately, the aim is for students to see themselves as belonging to a problem-solving community, within which they begin to adopt the techniques and working practices of professional mathematicians.

The first two sessions in Year 12 are used to explain and illuminate some important problem solving strategies: drawing a diagram; substituting numbers; looking for simpler or special cases first; attempting to formalise and generalise algebraically, and in particular reflecting on the *processes* used (as distinct from the mathematics used). By the summer of Year 12, after the third session, students have tackled lengthier real-world modelling problems such as the Beans Can optimisation problem. We also vary the context for solving problems: mixing students from different schools; using posters and presentations alongside more traditional written solutions; standing students in small clusters round a portable whiteboard (it does make a difference – try it) and a number of other devices to bring variety and pace to the sessions.



In Year 13 we aim to examine in more depth the various problem-solving strategies that have been identified in Year 12, referring students (and their teachers) to the work of Georg Polya and John Mason, to choose just two of the many influential writers in this field. We also encourage students to read more widely, because there are many interesting and accessible mathematics books to choose from. By the fifth and sixth events in the series, we make direct reference to STEP and AEA examinations, and use questions from these papers as the basis for a number of our problems

# Other News and Events

## More Enrichment!

### Enrichment Events in Schools

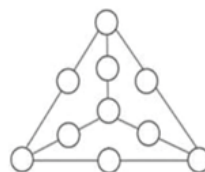
Over the last two terms we have run smaller enrichment events in school with KS4 pupils. These have a mathematical element along with some information on careers which involve A level and/or degree level mathematics. Please contact us if you would like to organise event (contact details below).

### Senior Team Maths Challenge

In collaboration with UK Mathematics Trust (UKMT) a number of Senior Team Maths Challenge events were held in the autumn term. These were very well attended by many teams from schools across the region. Pictured below are the winning team from



### A Step in the Right Direction



Can you place all the integers from 1-10 in the diagram, one in each circle, so that each line of three circles has the same total?

Does it work for any ten consecutive integers?

We provide regular problem solving meetings for students in the Liverpool area. These fortnightly meetings are primarily held in the informal setting of a coffee lounge at the University of Liverpool, with the aim of creating a relaxed but stimulating learning environment in which students are free to mingle and collaborate with others. The content of these sessions has been carefully considered to address what we see as a potential gap in our students' mathematical education, namely, the ability to analyse in detail basic number situations to begin to create proofs and discover new results (see example above). Building on this early work, students tackle problems involving squares, factors and primes, coupling elementary mathematical content with new and often challenging problem-solving approaches. We are very pleased with the response so far and we hope to continue and extend this trial to involve more schools and more students.



#### The Further Mathematics Support Programme

MEI Office  
Monckton House,  
Epsom Centre,  
White Horse Business Park,  
Trowbridge, Wiltshire BA14 0XG

T 01225 716 492  
F 01225 775 755

admin@furthermaths.org.uk  
www.furthermaths.org.uk

Managed by MEI  
Innovators in Mathematics Education  
Company registration number: 3265490

### North West Contacts:

Cheshire West, Chester, Halton, Knowsley, Liverpool, Sefton, St Helens, Warrington, Wigan, Wirral  
**Martin Bamber**  
[martinbamber@furthermaths.org.uk](mailto:martinbamber@furthermaths.org.uk)

Blackburn with Darwen, Bolton, Bury, Cheshire East, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford  
**Abigail Bown**  
[abigailbown@furthermaths.org.uk](mailto:abigailbown@furthermaths.org.uk)

Blackpool, Lancashire, Cumbria  
**James Groves**  
[jamesgroves@furthermaths.org.uk](mailto:jamesgroves@furthermaths.org.uk)

The NW region is assisted by  
**Sue Harkness**  
[sueharkness@furthermaths.org.uk](mailto:sueharkness@furthermaths.org.uk)

### North West Events page:

For teachers:  
[www.furthermaths.org.uk/NW\\_CPD](http://www.furthermaths.org.uk/NW_CPD)

For students:  
[www.furthermaths.org.uk/NW\\_enrichment](http://www.furthermaths.org.uk/NW_enrichment)

