

The National Picture

It is extremely pleasing that there continues to be an increase in the number of students studying mathematics post-16. Mathematics and Further Mathematics A levels entries have now reached an all-time high. Figures for summer 2013 (ALL UK) show that:

- AS level Further Mathematics numbers are up from 20954 to 22 601, an increase of 7.9%.
- A level Further Mathematics numbers are up from 13223 to 13 821, an increase of 4.5%.
- AS level Mathematics numbers are up from 148550 to 150 787, an increase of 1.5%.
- A level Mathematics numbers are up from 85714 to 88 060, an increase of 2.7%.

Since 2003 A level Further Mathematics numbers have increased by 160% (from 5 315) and AS Further Mathematics numbers have increased by 570% (from 3 371). However, there is still work to be done. Over 30% of state-funded schools/colleges offering A level Mathematics still do not have any students studying Further Mathematics. A major focus of FMSP work in 2013-14 will be to work with those schools/colleges who are still not offering their students the chance to study Further Mathematics. This will involve providing advice & guidance, CPD, enrichment, maths promotion at KS4 and KS5, as well as tuition in Further Mathematics when required.

The FMSP will be offering various types of Further Mathematics tuition again this year. In addition to face-to-face tuition and live online tuition the FMSP is extending its series of Live Interactive Lectures for FM, see below.

Professional Development for teachers

The FMSP offers a range of professional development for mathematics teachers including:

- **Live Online Professional Development Courses (LOPD)** aim to help teachers improve their mathematics subject knowledge. These online courses are typically offered twice a year; scheduled in Autumn (Oct – Feb) and Spring (Feb – June). They offer between 5 and 10 hours contact time with an experienced tutor and are delivered to small groups of teachers allowing opportunities for interaction and discussion. Course sessions are scheduled after the school day and are recorded to enable participating teachers to revisit the content at a later date. For further details and booking information for our LOPD courses see:

www.furthermaths.org.uk/teacher_area/rpd.php

- **Teaching Further Mathematics (TFM)** is an extended course starting in July and running for 14 months. Applications for the next cohort open in February 2014. TFM has the option of Masters accreditation.

- **Teaching Advanced Mathematics (TAM)** is a year-long course, with the option of Masters accreditation, for teachers wanting to develop their teaching skills at A level. Applications for TAM open in spring 2014.

Your local FMSP Area Coordinator will be arranging more professional development events in your area this year. For information about professional development please check the website www.furthermaths.org.uk/teacher_area. If you have any queries regarding the above please contact cpd@furthermaths.org.uk.

Live Interactive Lectures for Further Mathematics students

Our online lectures for Further Mathematics students will commence in October. These are designed to supplement students' independent study and/or teaching, including:

- Up to thirty hours of live online support which includes dedicated lectures and revision time.
- Access to the [Integral](#) extensive and acclaimed online resources. These have specific sections tailored to support self-study and include additional notes, additional exercises, interactive resources, multiple choice tests, exam-style questions and worked solutions.
- A moderated forum specifically for course participants.

Modules available for 2013-14 include: FP1, FP2, M1, M2, D1, D2 and S2 in Edexcel/MEI/AQA and OCR
: FP3 and M3 for Edexcel specification only

Further information and application details can be found at: <http://www.furthermaths.org.uk/liifm.php>

FMSP East of England Events and Updates

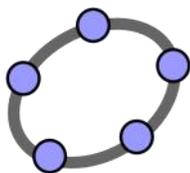
GCSE Problem-Solving CPD Day

University of Hertfordshire, 16 May 2013

Twenty three teachers from sixteen schools attended a CPD day at the University of Hertfordshire. The day was run by Kristin Coldwell and Alan Davies and considered the requirements of AO2 and AO3 questions now forming a significant part of the GCSE exam, the nature of problem-solving as an activity and how to improve these skills in students. The final session of the day looked at how problem-solving activities can be used to ease the transition to AS mathematics. The teachers found it a very useful day, they engaged very well with the hands-on problem solving activities and a common comment was "it's so nice to spend a day doing nothing but mathematics and working with other mathematicians". It was very clear that they all felt much more confident about handling problem-solving sessions in their own classrooms.

Geogebra CPD Day

University of Essex, 12 June 2013



On Wednesday 12th June 2013 we were lucky enough to have Tom Button, one of the Further Mathematics Support Programmes Senior Support Leaders visit the region to run a GeoGebra CPD day. The event was well attended. The teachers present were treated to many good interactive examples of how to use GeoGebra to enhance learning in their classroom and had plenty of time to experiment with the software.



Remember to check the FMSP website regularly to stay up to date with our CPD offerings and as always, if there is anything that you would like us to provide CPD for please let your Area Coordinator know.

A2 Further Pure CPD

University of Cambridge, 8 July 2013

Every year, the FMSP offer a range of CPD days for specific A level maths and further maths modules or related topics. It is never easy to predict what the greatest need in a particular area might be, but A2 Further Pure was obviously in some demand this summer. Nine delegates attended a course aimed at covering key topics in A2 Further Pure in Cambridge in July. The distribution of topics varies between exam boards so it was not possible to cover the entire syllabus for FP2 or FP3, but instead the most common topics of complex numbers, polar coordinates, Maclaurin series, hyperbolic functions and differential equations were explored. The course was mainly aimed at strengthening subject knowledge, but possible teaching activities and approaches always creep in.

Teachers who attended said:

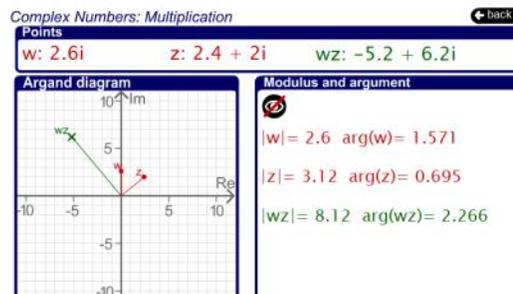
"...it served to remind me what I used to be able to do several years ago. Lots of practice I think!!"

"Excellent- good to see use of different resources."

"Very useful and will greatly assist my delivery of FP2."

A further course covering the topics of groups, vectors and matrices has already been planned for the 7th October, also at the University of Cambridge. The topics covered in July are not prerequisites for the October course, which may be attended by anyone wishing to strengthen their subject knowledge in FP3 or FP4 (AQA).

Integral > EdExcel_FP2 > Multiplication and division in the Argand diagram



Taking Maths Further - An Enrichment Day for Year 10 Students

University of Cambridge, Monday 1 July 2013

Sixteen teachers and 113 students from schools in Bedfordshire, Cambridgeshire, Hertfordshire, Peterborough and Suffolk attended a mathematical enrichment day at the University of Cambridge. The day was hugely oversubscribed, with at least as many schools having to be disappointed as actually attended. Perhaps the draw for many was the beautiful venue of the Centre for Mathematical Sciences; for others it may have been the opportunity to interact with Cambridge students and staff and hear a talk on infinity that was appealing. Some may have just looked forward to day away from school focussing on mathematics.

In response to feedback from previous attendees, the majority of the day was given over to hands-on workshops led by the likes of Charlie Gilderdale of NRICH, research student Alexander Shannon and Dr. Vicky Neale, director of the Cambridge Mathematics Education Project. Another workshop was run by current Cambridge graduate and undergraduate students, guiding the Year 10 students through various problems and activities from the NRICH website and the Millennium Mathematics Project's Fun Maths Roadshow. It is very difficult to ensure all students are able to attend all workshop sessions, but everyone got to experience Maths Magic with Derek Couzens, which was fortunate as it turned out to be very popular! Every school went away with a little bag of tricks to practise their skills and hopefully impress other students with. The day finished with a talk on the topic of infinity by Dr. David Bedford of Keele University. No one was surprised to find the ideas it contained perplexing and somewhat mind-bending, but many were surprised at just how entertaining the talk was and how down-to-earth it was (you can't get much more "down-to-earth" than ants and bricks!).

"The pupils had a fantastic day (and so did I) ... As well as supporting the students it has also given me more inspiration for my teaching." A teacher

"All of it pitched at the right level and made the students think." A teacher

"Magic Maths was fun and I will enjoy trying to replicate it at home." A student

"All sessions were interesting and useful." A student

"It's given me an insight to Uni life and taking Maths further." A student

The aim of this day was to show students a glimpse of the amazing depth and breadth of mathematics and to encourage them to continue studying maths beyond GCSE. The FMSP remains committed to offering similar enrichment days for Key Stage Four students in 2013-14, so keep an eye on the East of England FMSP webpage and book early to avoid disappointment!

Pictured: Cambridge students working alongside Year 10 students, group of Year 10s from The John Henry Newman School, David Bedford's tower of bricks based on infinite series.



Taking Maths Further - An Enrichment Day for Year 10 Students

Thursday 11 July 2013

The event attracted eight schools bringing one hundred and thirty students who saw three lectures together with a puzzle and a lunchtime quiz both set by Arnold Burdett. The puzzle session took place before the formal sessions started so that the early arrivals could enjoy some mathematical calisthenics. The quiz was for teams of no more than four members and took place over the lunchtime period. It was a typical 'Arnold' quiz with a mixture of straightforward questions and some rather tricky ones. Prizes were awarded to the top two teams.

The formal part of the day started with Dr Emma McCoy giving a talk entitled *The mathematics of Sudoku and magic squares*. Emma is a statistician in the Mathematics Department at Imperial College. This is just one of a variety of talks she gives on popular applications of mathematics and statistics and gave an interesting insight into a pastime enjoyed by millions who may not realise that they are engaging in a mathematical activity. The final lecture, in the afternoon, was given by Dr James Grime entitled *Alan Turing and the Enigma Machine*. James works for the Millennium Mathematics Project in Cambridge and his lectures on the enigma machine are well-received everywhere he goes, both within the UK and abroad. This was no exception and it was clear from the feedback that the audience was captivated by both his enthusiasm and material itself. The second lecture wasn't quite as billed. Ben Cloves from Wallington Girls' School was due to give a light-hearted session entitled *Ben's Maths Party*. Unfortunately Ben got held up by a serious accident on the M25 and it became clear that he would not be able to get to the University in time for the talk. So at the last minute Alan Davies stepped in to give a talk entitled *Superheroes, the maths and science*. The talk went down well but it meant that the day comprised three very similar activities; *Ben's Party* would have provided a nice contrasting session.

Year 10 Team Challenge Final

Tuesday 16 April 2013

Twenty eight schools, each bringing a team of four, came to Cambridge for the Regional Final of the Year 10 Team Mathematics Competition. Kristin Coldwell hosted the session, while Chris Saker presented the competition itself and Alan Davies gave an enrichment talk. The afternoon started with Alan's talk entitled *What's the use of quadratic equations?* followed by a short break. The competition started promptly at 4pm and lasted approximately three hours. All students enjoyed the afternoon and it was pleasing to see how well they all coped with the 'taught' material on the binomial expansion. The result was very close with just a few marks separating the top four teams. The winning team was The Perse School with Harrow School finishing second. The Year 10 Competition has run for a number of years in the East of England but ran in most parts of the country this year for the first time. Heats in the Eastern region will once again be held in school venues in February- please see the regional webpage for details.

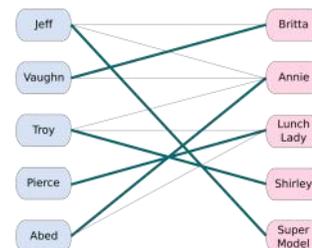
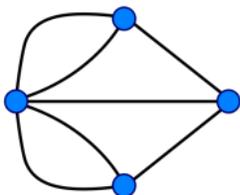
Pictured: Alan Davies and his chaotic pendulum, winning team from the Perse School, runners up from Harrow School.



Decision Maths Enrichment Day

University of Essex, 22 March 2013

On Friday 22nd March 2013 we ran a free enrichment day for Year 10 students, the aim of which was to give some insight into the world of Decision Mathematics at A-level. The Day featured lectures by Dr Abdel Salhi, The Head of Mathematical Sciences at the University of Essex, on optimisation, Dr Chris Saker on graph theory and Ramsey numbers and finished with an introduction to Game Theory by Sue De Pomerai from the Further Mathematics Support Programme where amongst other things the students learnt how they could use Mathematics to help them pick boyfriends / girlfriends!



Remember to check the FMSP website regularly to stay up to date with our enrichment offerings for the 2013/14 academic year.

Winsten Day

University of Essex, 1 July 2013

The 1st July 2013 saw the 3rd annual Winsten Day, a free enrichment event for Year 12 Mathematics students held in honour of Professor Chris Winsten at the Colchester campus of the University of Essex. The day was well attended with over 100 students and teachers turning out to enjoy talks. The day began with an opening lecture by Professor Alan Davies on the mathematics of superheroes. Following this, attendees split into smaller groups to engage in a student panel discussing what it is like to go to University as well as talks by Kevin Lord on detecting when numbers are really random or a faked random sequence, and by Professor Tom Scotto on why the social sciences need people with good mathematical skills. The highlight of the day, however, was the Winsten Lecture, this year given by Joe Twyman, Head of Political and Social Research at YouGov, who gave a very entertaining talk on identifying good, bad and ugly survey findings. We hope to see you all at the next Winsten Day on Thursday 3rd July 2014.

STEP Support Sessions for Students

STEP support sessions for students ran on four Saturday mornings again this spring, back by popular demand! Thirty-three students and six teachers attended one or more of the sessions, which meant some rearrangement of furniture was necessary to accommodate such a large group in some cases. The sessions followed a similar model to last year, running for three hours on non-consecutive Saturday mornings at school venues around Hertfordshire. The topics covered were also broadly similar, including proof by induction and contradiction, curve sketching and advanced trigonometry. This year there was also a session in which students could choose between statistics and mechanics in order to prepare for some of the applied questions. But the biggest change this year was the involvement of teachers to lead the sessions. Huge thanks go to Sue Cubbon of St. Albans High School for Girls, Val Pritchard of Roundwood Park School and Irina Tolchenova of The John Henry Newman School, who not only took time out of their Saturdays to attend, but also spent many hours preparing and leading sessions. Sue and Irina also hosted sessions at their schools (and Val offered!). Further thanks are also due to Penny Bevan of Parmiter's School and Leanne Ungaro of Hemel Hempstead School, who also hosted sessions.

This year the FMSP will be running a number of Student/Teacher Problem-Solving Conferences focussing on STEP and AEA. One such conference is planned for early January at the University of Cambridge. Please see the regional webpage for further details and to book places. We are also very happy to help and advise if teachers would like to join together as in Hertfordshire to offer additional support sessions for students.

Supporting Further Mathematics provision in the East of England

Is a **Further Mathematics qualification** offered at your school or college? Numbers of students taking Maths and Further Maths are continuing to rise. Furthermore, the percentage of state schools that are now offering the qualification is increasing. However, our aim is to ensure that **any** student who would benefit from the study of Further Mathematics has the opportunity to do so and there are still areas within the East of England where schools find this difficult to achieve. If your school does not offer Further Mathematics currently, or if you feel that you could increase your FM numbers with some support and advice then please get in touch. We have a range of very flexible strategies which we can use to support you and we would be delighted to be able to help.

Your local FMSP contacts:

For Bedfordshire, Cambridgeshire, North
Hertfordshire, Luton, Peterborough:

Kristin Coldwell

kristincoldwell@furthermaths.org.uk

For South Hertfordshire, Watford,
St Albans, Enfield or Barnet:

Alan Davies

alandavies@furthermaths.org.uk

For Essex, Norfolk, Southend-on-Sea,
Suffolk, and Thurrock:

Chris Saker

chrisaker@furthermaths.org.uk

2013– 2014 Diary dates for FMSP regional events:

Date	Event	Location
Monday 7 October 2013	A2 Further Pure Course	University of Cambridge
Thursday 10 October 2013	KS4 Extend and Enrich CPD	University of Hertfordshire
Saturday 12 October 2013	STMC Training Morning	University of Essex
Monday 14 October 2013	KS4 Extend and Enrich CPD	Copplestone School
Saturday 19 October 2013	STMC Training Morning	University of Hertfordshire
13 - 26 November 2013	STMC Heats	Regional venues
Thursday 5 December 2013	STEP/AEA CPD	University of Hertfordshire
6-14 Jan 2014 (tbc)	Y10 Enrichment Events	University venues
Thursday 16 January 2014	KS4 Extend and Enrich CPD	University of Hertfordshire
Monday 20 January 2014	KS4 Extend and Enrich CPD	TBC - Ipswich
Friday 10 January 2014	M1 CPD Day	University of Essex
Monday 13 January 2014	Problem-Solving Conference	University of Cambridge
TBC Feb / March 2014	Y10 Team Maths Comp Heats	Regional Venues
Thursday 3 March 2014	Y10 Team Maths Comp Final	University of Cambridge
Wednesday 23 April 2014	Y10 Enrichment Day	University of East Anglia
TBC July 2014	Y10 Enrichment Events	University of Hertfordshire, Cambridge

For complete up to date details, dates and venues please visit our [regional webpage](#)

FMSP Online revision sessions will be scheduled from April for Further Pure Modules and Applications modules (available in each of the main four Exam Specifications) to help students prepare for summer exams. Online revision sessions are available for FMSP students and students studying at FMSP registered schools/colleges. FMSP Registered school contacts will receive full details via email to pass on to their students.

Schools and Colleges can submit an annual online request to register with the Further Mathematics Support Programme. It is free to do so and there are many benefits. Please try to ensure that your school / college's FMSP registration is up to date so we can keep you updated and informed of all the opportunities available to schools, colleges, students and teachers.

REGISTER NOW