

Let Maths take you Further...

IMPORTANT DATES

Conferences for Centre Managers

- Spring 2007 Conference, April 25th and 26th.
- FMN Day at the MEI Conference, July 5th. (full conference is July 5th to July 7th)
- Autumn 2007 Conference, October 15th and 16th.

Dates for termly returns

- Spring Term: Friday 20th April 2007.
- Summer Term: Friday 20th July 2007.

Tutor training

- June 14th, London.
- June 15th, Exeter.
- June 22nd, Manchester.

GREAT NEWS

- Feedback on the large number of revision and enrichment days, which ran prior to the January exam series, has been extremely positive.

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Embedding the Network

Now that all of the Further Mathematics Centres are operational, we need to concentrate on really embedding the Network as part of the fabric of secondary and sixth form mathematics education. We are reaching a huge number of schools, colleges and students (at the last count 1147 schools and colleges were registered with the Network), but there is still a way to go. We must ensure that all schools and colleges know about the support offered through their local FM Centres and that every student planning to take AS/A level Mathematics is aware of AS/A level Further Mathematics and able to make an informed choice about whether they wish to study it.

As a result of the Network widening access to Further Mathematics qualifications, universities are starting actively to encourage students to take them. Rod Bond's article on page 4 gives evidence of this. In the past universities have been reluctant to encourage Further Mathematics because many students had no opportunity to study it. The Network is changing this and as more universities encourage Further Mathematics, so more students will take it. This will improve students' mathematical preparation for Science, Technology, Engineering and Mathematics (STEM) degrees, something which has long been of serious concern to universities.

The wide range of mathematics events we are organising across the country, as exemplified in pages 4 - 6, is certainly raising the profile of mathematics and demonstrates our success at inspiring students to develop their mathematical skills. Please see page 3 for details of a new 'Senior Team Challenge' we are piloting with the United Kingdom Mathematics Trust, which we hope will make a very positive contribution to our work in promoting mathematics.

Many FM Centres' student numbers are increasing significantly, so the training of FM Network tutors, to work alongside the Centre Managers, has become increasingly important. Following on from the announcement in our previous newsletter, the first three tutor training events have now taken place and by the end of this academic year we will have developed a course that FM Centres will be able to offer locally to every FM Network tutor.

Charlie Stripp, Programme Leader

TFM is now enrolling students for 2007/2008

The initial group of students on the Teaching Further Mathematics course, who started in May 2006, is now over half-way through and we are currently taking applications for the second cohort of students.

Following feedback from our current cohort we have changed the course structure slightly, so that new participants will study FP1, FP2 and one from Numerical Methods or Differential Equations, though keen students can still study both.

Further information and an application form can be downloaded from the MEI website

<http://www.mei.org.uk/cpd/tfm/shtml>

Applications close on 30th April. Please spread the word in your region. Last year there were more applications than there were places, so if you know anyone who is thinking of applying, advise them to get their forms in as soon as possible.

If you need more information, please do get in contact.

Sue de Pomerai, Assistant Programme Leader



FMN Remote Tuition Team

The Remote Tuition Team (RTT) was formed in January of this year, with the aim to facilitate the provision of real time tuition via the internet within the Further Mathematics Network. At the moment the team consists of myself, Tom Button and Martin Bamber. To date the team has been engaged in testing software used to deliver on-line tutorials from desktop to desktop or desktop to classroom, with a focus on providing tuition to sixth formers studying for Mathematics STEP papers. For me, remote tuition is proving to be a refreshing way to deliver mathematics teaching; the level of focus and intensity in on-line sessions is something I have found particularly exciting and rewarding.

Another element of the work of the team is exploring the use of lectures streamed live through the internet. These could help to further enhance the tuition offered by the FM Network, particularly for those students studying the higher modules like FP3, DE, S3 and M3.

At the next FM Network Conference in April, the RTT will give a full report on its work so far. We hope to provide a detailed account of what can be achieved through remote tuition, and detail the support that we can offer FM Centres wishing to set up their own remote tuition provision. In addition, we will be making preliminary announcements regarding the tuition that the RTT can offer students in your region, should you have any students for whom setting up face-to-face tuition is not possible.

Any FM Centre Manager should contact me if they wish to

- a) be involved in any of the above trials
- b) discuss the findings of the RTT so far or share their findings
- c) provide remote tuition to other regions.

Richard Lissaman, Deputy Programme Leader

Good news from Imperial College Medical School

As a direct result of a request from the Further Mathematics Network, from next academic year Imperial College Medical School will accept AS Further Mathematics as part of their offer. Up to now Further Mathematics qualifications have been excluded from their offers.

Imperial College Medical School's standard offer is AAA in three A levels, plus a B in an AS level. They will continue to accept only one A level in Mathematics as part of their standard offer, but will give credit for Further Mathematics as a fourth subject at AS or at A level.

Please see http://www.mei.org.uk/files/pdf/FM_and_medical_schools.pdf for a paper on Further Mathematics and Medical Schools that MEI has agreed with the Council for the Heads of Medical Schools.

We hope that Imperial's change of view will help us to change the admissions policies of other medical schools.

Please do let me know of any specific instances of students being discouraged from taking Further Mathematics because of medical schools' policies.

Charlie Stripp, Programme Leader

Regional meetings

As highlighted in issue 3 of the Further Mathematics Network newsletter, following the success of the South West Regional meetings, the fifth of which took place at Oak House on 5th March, regional groups throughout England have been established. Several meetings within these groups have taken place since the last FM Network Newsletter.

The Eastern region had their fourth meeting on 6th March, London and the South East and the North East/Yorkshire and Humberside had their second meetings on 14th March and 20th February respectively. The Midlands and the North West will be having their second meetings soon.

Feedback from these meetings has been very positive. Managers report that it is very useful to be able to meet with managers from their neighbouring centres, particularly to discuss the opportunities for collaboration for activities such as revision days and enrichment events. They also highlight that the meetings give them an opportunity to exchange ideas on the day-to-day running of their centres. The sharing of experience, and in particular of good practice, is something that the FM Network is very keen to promote; there is a wealth of knowledge and experience amongst FM Centre Managers and these meetings provide a forum where managers can share expertise and support one another.

Notes from the discussions and dates of the next meetings can be found in the managers' area of the FM Network website, http://www.fmnetwork.org.uk/manager_area/regional.php

Stephen Lee, Professional Officer

The UKMT/FMN Senior Team Challenge

Many thanks to all Further Mathematics Centres that are to be involved in the pilot of this competition next academic year. There will be sixteen regional heats, held at the following FM Centres in the autumn term:

- 1) Berkshire
- 2) The Black Country
- 3) Buckinghamshire
- 4) Coventry and Warwickshire
- 5) Devon
- 6) *Joint*: Durham and Tyne & Wear
- 7) Gloucestershire
- 8) *Joint*: Hampshire & Isle of Wight and Dorset
- 9) Herefordshire and Worcestershire
- 10) Hertfordshire
- 11) Lincolnshire
- 12) *Joint*: London Centres
- 13) *Joint*: North Leicestershire and South Nottinghamshire
- 14) Suffolk
- 15) *Joint*: West of England and Somerset
- 16) West Yorkshire

The teams of 4 students will consist mainly of sixth form students but year 11 students may be included too. We aim to hold a national final at the end of January 2008 at a prestigious London venue.

Originally the intention was to run 10 regional heats but, due to the number of FM Centres wanting to be involved, we have decided to run with 16 regional heats.

We hope that, by promoting this event through local FM Centres, it will attract many sixth form students and some year 11 students who may not otherwise have been involved in such competitions. We believe that many students who may not have had the confidence to enter an individual competition will be attracted to a team competition and will enjoy it enormously.

It has been very exciting to work with staff at UKMT to develop this pilot and we would like to thank them and all of the FM Centre Managers who will be involved in setting up the regional heats. We are looking forward to a successful pilot project, which we hope will develop to become a regular fixture in the national mathematics enrichment calendar.

Richard Lissaman, Deputy Programme Leader

Encouraging universities to promote FM

As discussed on page 1, some university departments are now beginning actively to encourage students to take Further Mathematics. If you know of any university departments that are doing this either through their publicity, or by including Further Mathematics in their offers, or by offering bursaries for students with Further Mathematics qualifications, please let us know. If your local university's mathematics/engineering/physics/computing or other strongly mathematics-related departments are not yet encouraging students to take Further Mathematics, please do discuss this with them, pointing out that the Further Mathematics Network means that all students now have an opportunity to study Further Mathematics. We don't expect them to make places conditional upon Further Mathematics, but we would like them to encourage students to take it when it would be useful to support their degree studies.

Charlie Stripp, Programme Leader

AS FM in Year 13

AS Further Mathematics in year 13 is an excellent option for any A level Mathematics student (not just the high-flyers) who plans to study for a mathematics-related degree. It gives students the opportunity to learn some new mathematics that will be relevant and useful to them on their degree course and it may well help to boost their standard A level Mathematics grade. It also looks impressive on a UCAS form if a student can say they have chosen to study AS Further Mathematics (by no means a soft option!) to support their planned degree studies.

Charlie Stripp, Programme Leader

News and events from the FM Centres

WILTSHIRE FMC

Wiltshire Able Gifted and Talented Event (AGAT)

Andrea Perks and Benn Griffin, the Centre Managers in Wiltshire, recently held a second enrichment event for Year 10 and 11 Able, Gifted and Talented pupils. The idea is to boost the number of pupils taking Mathematics at A level. By holding the event in January, pupils are (hopefully) enthused prior to making their A level options. They also become aware of the Further Mathematics Network and what is on offer. Following the success of the first event, held a year ago, and which had been attended by 350 pupils from across the county, the pressure was on to host an equally successful event.

Lecturers from the University of Plymouth again gave presentations. Dr. Ted Graham looked at "A Level Maths: What to expect", whilst Dr. Martin Lavelle and Professor David McMullan investigated "Maths with Bubbles". They were joined by Professor Chris Budd of Bath University who gave a talk entitled "Criminology", which looked at how mathematical formulae are used to help solve crimes. All presentations were repeated, as more pupils attended than could be accommodated in one hall.



Ted Graham involves pupils in Wiltshire.



The three prize winners.

The feedback received from pupils and teachers was extremely positive, and it was felt that the event ran even more smoothly this time around. Extra touches like a lunch time quiz with prizes went down well with the pupils. The best news received was that a number of pupils decided that A level Mathematics was for them after all.

Gluttons for punishment, Andrea and Benn already have another AGAT event booked in for next January, and one school has already promised to send a coach load of pupils, as they were unable to attend this year's event!

Andrea Perks and Benn Griffin, Wiltshire FMC Managers

NORTH LEICESTERSHIRE FMC

Good News For The Network

The message seems to be getting through to universities regarding the value of studying Further Mathematics. Two recent comments from sixth form students are:-

EMMA – I am really pleased about my offer to read Mathematics at Warwick. I am aiming to achieve an A grade for Further Mathematics and so I do not need to take the Step Papers. In addition my offer is AAAB. This would have been AAAA if I had not been studying Further Mathematics.

LAUREN – I am a very passionate year 12 student currently taking Physics, Mathematics, English and French, and am really keen on applying for Physics at university. However, looking in to the application process further, I realise that many universities, particularly prestigious ones, recommend or find desirable, Further Mathematics. My Mathematics teacher gave me your contact details so that I could find out whether there were opportunities to study the modules of the Further Mathematics course, particularly those such as Pure Mathematics that are very relevant to Physics as a degree subject. I would be very grateful if you could email me in order to tell me if it would be possible to be involved in such a thing at your Centre, and give me details of any such opportunity.

This student's school has been contacted and they have spoken with Lauren's mother who wants to go ahead. Consequently, I will be contacting Lauren again to arrange how we can work with her. (Note. Pseudonyms have been used to preserve the identities of the two students.)

Rod Bond, North Leicestershire FMC Manager

KENT AND MEDWAY FMC

50 Kent and Medway Further Mathematics Students attended a FP1/D1 study day at the University of Kent at Canterbury on 21st February 2007. The students came from six FM classes scattered throughout the county. The University were very welcoming and provided a well-appreciated lunch. Special thanks to Loba Van der Bijl at the University for arranging the facilities at the University and to the two tutors, Angela Lloyd and Ismael Karam.

Derek Couzens, Kent and Medway FMC Manager





The London Centres made their Revision Day debut with a Decision 1 day at Imperial College in January. A mixture of Edexcel and MEI students attended this event; they split into two separate groups in the afternoon for exam board-specific sessions.

Chris Brown, the London West FMC Manager, is based at Imperial and ensured that the day ran smoothly. Pat Morton, the London East FMC Manager, inspired the students with talks on How to Revise ("Practise questions until your brain hurts"!) and Exam Technique.

Our next project is the ambitious task of running an FP1 Revision Day – for all boards! – which will take place at Kingston University on May 30th.

Jenny Davey, London SW FMC Manager

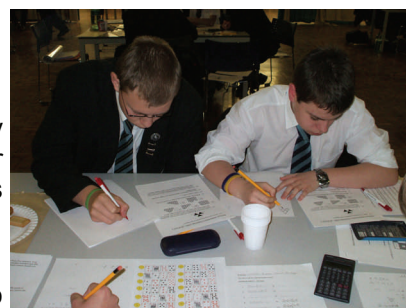
KENT AND MEDWAY FMC

Mathematics Challenge

On 6th February 2007, nine schools sent teams of four to the First Medway Mathematics Challenge. The Challenge was a "wine and wisdom" format - with four rounds of ten questions and a marathon round. A special thank you to Bob Francis of the Devon FM Centre for help with the format and many of the questions.

Congratulations go to the winners, Chatham Grammar School for Boys, who received an engraved salver. The students who were placed in one of the first three teams also each received medals – all the awards to be retained permanently. Photos from the event were also published in the local newspaper.

Derek Couzens, Kent and Medway FMC Manager



Enrichment Events

Dorset Further Mathematics Centre will be running the following enrichment day:

- July 4th - Year 10 Maths Enrichment Day at Bournemouth University

The programme and list of speakers will be posted on the Dorset FM Centre web pages shortly, and invitation letters will follow to all Dorset schools.

Jo Sibley, Dorset FMC Manager

Cambridgeshire Further Mathematics Centre will be running the following enrichment events:

- June 29th and July 3rd - 'Mathematical Opportunities' for Year 10 students
- July 10th and July 13th - 'Enriching Experience' for Year 13 students

Please see the Cambridgeshire FM Centre web pages for further information.

Stephen Hewson, Cambridgeshire FMC Manager

SOUTH NOTTINGHAMSHIRE FMC & NORTH LEICESTERSHIRE FMC

Mechanics Workshops

Over the past few months a series of half day workshops has been organised for year 11 students in schools and colleges in our area. These have been hosted at the Mathematics Education Centre, Loughborough University, the University of Nottingham (with the help of their Widening Participation Team) and within various schools and colleges.

The aims of the sessions were:-

- To interest and enthuse students about mechanics so that they may wish to study mechanics modules within their A level courses.
- To encourage students to work and talk with keen postgraduate students as a way of developing positive attitudes to the study of mathematics at a higher level.
- To make contact with teachers in schools and create a warm, positive relationship between them and staff at the Further Mathematics Centre, which helps to pave the way for more collaboration with future events.
- To give students and staff a most enjoyable experience.



The sessions dealt with modelling with circular motion. Initially students were given the opportunity to discuss the forces associated with a pendulum. This work was then extended to look at motion in a circle as found in the rides at Alton Towers. For this purpose a video was shown entitled 'Mechanics in Action'. Although an old video it provides much interesting information about misconceptions regarding mechanics (this was produced by the Mechanics in Action Project, School of Mathematics, University of Leeds).

Students then worked in small groups using materials from the 'Leeds Mechanics Kit', where circular motion in various forms was investigated. Groups of students were encouraged to explain their findings by addressing the whole group.

A mechanics quiz was set for all participants and two students were awarded prizes for their entries.

Feedback from the sessions has been good and indicates that this sort of activity makes students think carefully about forces. It also proves that mechanics can be seen as an interesting activity and, hopefully, is worth considering for study as a module choice. In addition, working with outstanding postgraduate students must also have some impact upon their enquiries relating to choice of Higher Education courses.

If you would like to know more about the workshops please contact Barbara Rundle at barbararundle@fmnetwork.org.uk

Barbara Rundle and Rod Bond, South Nottinghamshire FMC & North Leicestershire FMC Managers

BERKSHIRE FMC

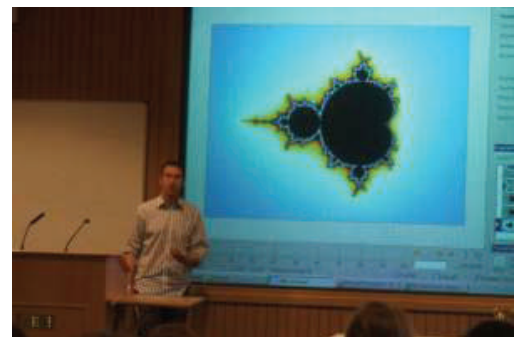
Year 11 Enrichment Day

Year 11 students from across Berkshire gathered at Reading University to hear Dr Martyn Parker give a very animated and involving lecture about Fractals and Chaos Theory, taking such diverse starting points as the length of the UK coastline and the number of ways to get to any intersection in Milton Keynes!

Whilst the students attended a talk about Mathematics in Meteorology, their teachers had a chance to test their practical skills with a soldering iron, making miniature electronic devices under the guidance of members of the Engineering department.

For the final session, all the students formed teams to compete against each other, solving a range of mathematical problems against the clock. The winning team came from Little Heath School in Reading. The Berkshire managers are particularly indebted to Rachel Fretwell from Reading University's Widening Participation Office for her help with the organisation of this successful event.

Anne Guinamard, Cassie Moran and Jeff Trim, Berkshire FMC Managers



A puzzle
and some
interesting
students'
solutions

PUZZLE

What positive number is:
less than 3000 and,
when divided by 2 leaves a remainder of 1,
when divided by 3 a remainder of 2,
by 4 a remainder of 3,
by 5 a remainder of 4,
by 6 a remainder of 5,
by 7 a remainder of 6,
by 8 a remainder of 7,
by 9 a remainder of 8 and
by 10 a remainder of 9?

How can you be sure that there is just one number
between 0 and 3000 which satisfies this?

If you don't insist that the number is less than 3000,
can you give any others?

Can you give a general expression describing all the
numbers satisfying this?

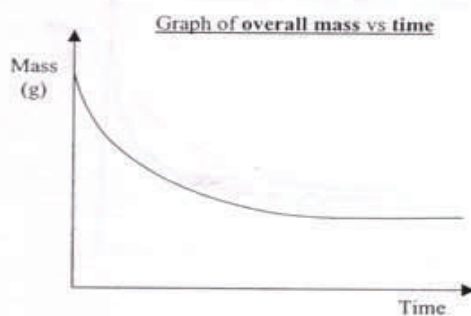
(The solution will appear in the next issue)

$$\frac{1}{n} \sin x = ?$$

~~$$\frac{1}{n} \sin x =$$~~

$$six = 6$$

Interesting logic!



1. Explain the shape of the graph.

Its curvy, with a higher bit at the end and a rather aesthetically pleasing slope downwards towards a pretty flat straight bit. The actual graph itself consists of 2 straight lines meeting at the lower left hand corner of the graph and moving away at a 90° angle. Each line has an arrow head on the end.

A polynomial walks into a bar and asks for a pie and a pint.
The barman replies "Sorry sir, we don't cater for functions"

A young woman says to her mathematician boyfriend:
"I think you love your maths more than me"
He replies "Of course not, darling - I love you much more."
"Then prove it!" says the girlfriend
"OK... Let R be the set of all lovable objects..."

Why did the chicken cross the Möbius strip? To get to the other - er...

(Thanks to those who submitted the Puzzle, Pictures and Jokes, particularly Sue and Tim)

Mathematical
Jokes

Recreational Mathematics

Last issue we posed you a question:

Question: '5+5+5=550'... can you add a straight line to make the equation true (just crossing out the equals sign ISN'T what we have in mind)

Answer: Put a straight line to one of the + signs to make 4 so you have 545+5=550 or 5+545=550.

(Thanks to Richard and Tim for that one; it goes down very well at break time at revision days.)

Solution to Monge's circle theorem:

A great example of "proof by visualisation":

Imagine that you are looking at an overhead view of three spheres resting on a table. Now imagine that the tangent lines in the diagram are actually an overhead view of three cones, each of which contains two of the spheres. It follows that the vertices of the cones will be on the table.

Imagine a plane passing through the centres of the three spheres. It will intersect the three vertices of the cones. So that the three vertices each lie on the same two planes (the one described in the previous sentence, and the table). Hence, they must all lie on the intersection of these two planes, which must be a straight line.

A prize for anyone who can get a decent picture of this using Autograph!

Alternatively, we would be interested to hear of any other solutions to the problem!

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for the latest from the Network don't forget to visit the website every week

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Let Maths take you Further...