

INSIDE THIS ISSUE:

Professional development	2
GCSE Extension materials	2
STMC Final	3
Conference invitation for teachers	3
News and events from the FM Network Centres	4
Mechanics report	6
Recreational mathematics	7
Contact details	8

IMPORTANT DATE

- The FMN ceases operation on 31 July 2009, to be replaced by the new FMSP.

GREAT NEWS

- The FMSP will continue to give students access to Further Mathematics tuition and will meet the FMN's tutoring commitments for academic year 2009/10.

Further Mathematics Support Programme

The Further Mathematics Network is coming to an end in July, but its success means that the DCSF will continue to provide funding to support Further Mathematics, despite the current deep cuts in government spending. The FM Network has rescued Further Mathematics from what looked like a terminal decline. Since the FM Network started in 2005, entries to AS Further Mathematics have risen by 125% and entries to the full A level by 59%. When the FM Network started, Further Mathematics was largely unavailable to students in the state sector. Through the work of the FM Network its fortunes have been transformed to make it one of the fastest growing subjects, increasingly valued by universities and employers.

From August the FM Network will be replaced by the Further Mathematics Support Programme (FMSP).

The FMSP will continue to work to improve access to Further Mathematics tuition and to increase the numbers of students taking mathematics at level 3. It will provide tuition to students where necessary, but will have a much greater emphasis on

- providing specialised professional development to teachers;
- encouraging and supporting delivery of Further Mathematics through consortium arrangements, where students from more than one institution can be taught together.

A major aim will be to increase the number of schools and colleges that can teach Further Mathematics themselves, so reducing the need for external tuition.

As well as supporting Further Mathematics, the FMSP will also have a role in supporting the teaching and learning of level 3 mathematics in diplomas.

Support will be provided across England. MEI is the DCSF's preferred supplier to manage the FMSP.

Charlie Stripp, Programme Leader (FMN)

Where can studying Mathematics take you?

The FM Network has helped to create a video highlighting exciting careers that are available to people who study Further Mathematics.

In early 2009, Man Group plc, a leading investment management business, asked MEI, as the organisation that manages the FM Network, to advise it on the production of a short video that shows advantages of learning mathematics as a means of achieving an excellent career.

The video shows short clips of people, in their places of work, explaining their careers. The video is designed to make the point that studying Further Mathematics helped these people. MEI identified a dozen people willing and able to take part in the project, and four of these were included, together with an employee of the Man Group. We then worked closely with Fat Rat films to ensure the approach to the filming met our objectives. The filming was carried out in the participants' places of work, which has added some interesting visual details to the video.

The video is currently available on the FM Network website, see:

www.fmnetwork.org.uk/student_area/whystudyfm2.php or at the MEI YouTube page: www.youtube.com/user/MEImaths (which also links to other relevant videos).

We would like to encourage other organisations and establishments to use the video where they feel it appropriate. You may wish to simply link to the video but it can actually be embedded into a website by using the details on the YouTube page. An example of this can be seen at: www.mathscareers.org.uk/careers_advisers/maths_mpegs.cfm

Richard Browne, Programme Leader (Industry)



Teaching Further Mathematics

It is now possible to take the Teaching Further Mathematics course as part of a Postgraduate Certificate in Teaching Further Mathematics through the Institute of Education at the University of Warwick. The PG Cert carries 60 CAT points towards a Masters degree in Education and the points are transferable for those who want to complete their masters at another university. This is a great opportunity for maths teachers who want to develop their teaching skills and gain an additional qualification.

We are currently taking applications for TFM 2009. Information and application forms can be found at www.fmnetwork.org.uk/teacher_area/tfm.php

Live online Professional Development

The LOPD programme is also developing and Sharon Tripconey and I have been joined by Dick Russell and Yvonne Croasdaile as course tutors. We have been involved with two NCETM projects, the latest in conjunction with the East London Post-16 group, organised by the FM Network Manager Pat Morton, and have gone international, having a teacher from Istanbul who is about to start her second LOPD course. So far, I've failed to persuade anyone that I need to visit for a face-to-face tutorial!

Quotes from participants

"At the start I was a little nervous as I couldn't see the people I was speaking to and it might be difficult to see how they were reacting to my ideas. This soon changed, however, and I became more confident and happy to use the microphone."

"This is not a passive learning experience..."

"...This is really how professional development should be."

The courses being offered this term are given at:
www.fmnetwork.org.uk/teacher_area/rpd.php.

Next term we're intending to offer long courses in FP1, M1, S1, AS Core, and D2; short courses in complex numbers, calculus for A2 FM and differential equations as well as some one-off sessions for C3 and NM coursework. We will also be developing new courses to support the Level 3 diplomas.

If you are interested in taking any courses or in tutoring them please let me know.

Sue de Pomerai, Assistant Programme Leader (FMN)

The FMN is pleased to promote a set of twenty GCSE Mathematics extension materials aimed at students who are working towards GCSE Mathematics and would benefit from exposure to mathematics beyond GCSE.

The materials, produced by MEI, are intended to introduce students to new ideas and to stimulate their interest in the subject, whilst reinforcing some of the concepts in GCSE.

Each resource:

- ⇒ Starts from a topic or idea that is in GCSE Mathematics and features a 'What you should know' section.
- ⇒ Has a 'New idea' that is an extension to GCSE Mathematics.
- ⇒ Has a task for students to attempt so they can investigate the idea.
- ⇒ Has ideas for further investigation suggested in a 'Take it further section'.
- ⇒ Contains a brief explanation of how this topic is developed at A Level.
- ⇒ Is on a single sheet of A4 which can be copied and given to students.
- ⇒ Has teachers' notes, including solutions. These are available to all schools which subscribe to the online resources or register with the Further Mathematics Network. Registration with the Further Mathematics Network is free and provides access to information about local events which could be useful for your students. See: www.fmnetwork.org.uk/register.php

The materials are free to all. To see them, and some suggestions for how they can be used, go to www.fmnetwork.org.uk/gcseextension.php

Charlie Stripp, Programme Leader (FMN)

**Professional
Development**

**Free GCSE
Maths
Extension
Materials**

UKMT / FMN STMC Final

Sixty teams competed in the national final of the Senior Team Mathematics Challenge this year. The final took place on February 10th, having been postponed from the original date a week earlier due to snow in London.

Over 800 teams of sixth formers took part this year and the regional finals, involving over 50 heats, were highly competitive. The 60 teams that made it to the national final contained some of the most outstanding young maths students in the country.

Feedback from the event was excellent:

"Thank you for helping to organise such a worthwhile and fun competition. The boys I accompanied had a super time (so did I!), and those in the lower 6th are already looking forward to next year's senior team challenge."

"My team thoroughly enjoyed the event and the whole occasion. I thought it was very well run and a good but enjoyable standard. I hope that we make the final again soon."

"We had a fantastic day – many thanks to you for all you do. It is a tremendous competition, with brilliant questions and a superb atmosphere. Absolutely fantastic."

"Many thanks for a splendid occasion. My pupils really enjoyed the day, and it did them no harm at all to return with slightly bruised egos!! We look forward to taking part in future events."

The winners of the 2008/09 competition were Westminster School. Their team: Andrew Hyer, James Male, Ramana McConnon and Anna Seigal, can be seen in the picture below receiving their prizes and the trophy from Simon Singh.

We are very keen to make this competition even bigger and better in 2009/10. Please help us to do this by letting as many maths teachers know about the competition as you can. Questions from previous competitions are available on our website; we'd like as many students as possible to try them.

Once again many thanks to all those involved in the organisation and running of the events and to all those who participated.

Richard Lissaman, Deputy Programme Leader (FMN)



The FM Network is always eager to promote the importance of able mathematics students to industry.

MEI and the IET are to hold a second joint conference on 1 June 2009, with the title *The uses of mathematics in the engineering workplace*. The conference will be held at the IET London offices in Savoy Place.

We would like practising teachers to attend, to help consider the steps needed to provide exemplars of mathematics being used in the engineering workplace, in a form that is suitable for teachers to use with their students.

Part of the conference will involve starting work in small groups to develop exemplars based on workplace experiences of breakout group leaders.

Please contact richardbrowne@fmnetwork.org.uk for more information.

The report of a 2007 joint conference with IET, entitled *Attracting the best students of mathematics into engineering* can be seen at:

www.mei.org.uk/files/pdf/MEI_IET_Report.pdf

Richard Browne, Programme Leader (Industry)

Conference Invitation for Teachers

News and events from the FM Network Centres

DORSET FMNC

Take Maths to the Limit!

On Wednesday 11th Feb 2009 the Dorset FM Network Centre held its second **Take Maths to the Limit!** conference for Year 12 and 13 mathematics students at Bryanston School in Blandford.

Sue de Pomerai kicked off the events with her new talk "Coughs and Sneezes Spread Diseases" followed briefly by Ben Sparks, who stepped into the breach when Richard Lissaman got stuck in traffic. Ben produced a fascinating presentation on Fractals, apparently from his back pocket – proving that it was a good decision to bring him back from his world travels for the event!

Richard's presentation on Google and Lara Croft impressed again (although we were disappointed that we didn't get to try out his famous PlayStation 3 due to the shortened time available) and Ted Graham's talk on mathematical modelling appealed to students interested in applications of the mathematics they are currently studying.

Martin Lavelle's presentation on Careers in Mathematics and Statistics made it difficult to see why anyone would want to study anything BUT mathematics at university.

The lunchtime fair was designed to give the students an opportunity to try some more hands-on activities, as the Coade Hall at Bryanston does not easily lend itself to this, and students were invited to help complete a second order Menger Sponge – a 3-D fractal built from donated business cards. John Tansey's beautiful non-circular gears had a Valentine's theme and Ben again drew crowds with his presentation and puzzle questions.

The quiz was designed to stretch the students' creative talents as well as their mathematical ones, asking them to write a mathematically themed poem or to draw a picture based on the theme of fractals, as well as simplifying an infinite series and calculating the number of possible solutions to a word equation. The competition was stiff, although whether the entrants were vying for the calculators, the chocolate or the coveted geometry sets is unsure!

Heartfelt thanks go to the staff of Bryanston School, particularly Chris Poole, for the free use of their wonderful facilities, and to all the speakers: many students responded that the event had inspired them to study mathematics to a higher level.

Jo Sibley, Dorset FMNC Manager



CAMBRIDGESHIRE FMNC

Strong Competition at the Year 10 Team Challenge

Over one hundred Year 10 pupils from across Cambridgeshire and its neighbouring counties represented their school in a Mathematics Team Challenge. There were two heats; one hosted at Thomas Deacon Academy in Peterborough and one heat hosted at Linton Village College. Pupils competed against each other in teams of four. They were asked to solve problems in a race against the clock. One round involved them answering questions on 'Maths from Yester-year', for example, 'In 1956 a man bought a suit for £3 17s 9d, a shirt for 3s 6d and a pair of shoes for 13s 11d. How much change was there from a £5 note?'

Winners and runners up from both Cambridgeshire heats will now be invited to compete against teams from Essex, Norfolk and Suffolk at Stowupland High School, Stowmarket, Suffolk. We wish our students the best of luck in the Eastern Counties final! The winners, Chesterton Community College, from the heat hosted at Linton are pictured here.

The winners from the heat hosted at Thomas Deacon Academy were The King's School, Peterborough. Congratulations to both teams!

Sharon Tripcony, Cambridgeshire FMNC Manager



NOTTINGHAMSHIRE FMNC**Mathematics Taster Afternoon**

In February 2009 the University of Nottingham's main campus was overrun with 130 eager young mathematicians. Six schools from across the midlands took part in a fun-filled afternoon of mathematics at an event run by the South Nottinghamshire FM Network Centre.

With no time to waste, proceedings began on the dot at 12:30pm with a short introduction from Ria Symonds, the South Nottinghamshire FM Network Centre Manager. The afternoon was then kicked off by Tom Button with an inspirational and educational presentation about 'Mathematics in Video Games'. Tom showed students how A level Mathematics and Further Mathematics is used in the creation of video games. This involved looking at the concept of vectors and using a novel approach of audience participation by requiring the students to map out vectors using their arms.



The second session of the afternoon put the students' mathematics skills into action using the 'Liverpool Fun Maths Roadshow' resources. The 45 minute session saw a remarkable amount of brain power and mathematical reasoning as teams worked together to solve 30 various mathematics based exercises. Even the teachers were encouraged to get involved with the session since they were allocated the important job of checking off the answers (but of course the answer sheet was merely used for reference by the teachers!).



After a quick refreshment break of orange juice and chocolate biscuits (rumoured to be the source of brain power of some of the great mathematicians) it was time for the last session of the afternoon. Colin Wright wowed the audience with his magisterial integration of finger-dexterity and mathematical interpretation of juggling. With a little bit of mathematics and a lot of imagination, Colin demonstrated how juggling tricks can be accurately described by a simple series of numbers.

The event was a huge success and received some extremely positive feedback from both the students and the teachers. Many thanks to everybody who contributed to such a fantastic afternoon.

Ria Symonds, Nottinghamshire FMNC Manager

BUCKINGHAMSHIRE FMNC**Taking Mathematics Further Enrichment Day**

Another 300+ students plus teachers recently descended on Aylesbury High School for Buckinghamshire FM Network Centre's 3rd annual 'Taking Maths Further' day aimed at encouraging Year 10/Year 11 students to study mathematics beyond GCSE. The local authority supports the day financially. The school had an INSET day that freed up two large halls and adjoining the school is Aylesbury Music Centre which allowed us to use its recital hall also.

Two pairs of Buckinghamshire teachers led sessions – Julia Brown from Wycombe High School and FMNC tutor Ashley England from Dr. Challoner's Grammar School introduced students to Dijkstra's algorithm and the minimum connector problem in a session entitled 'Catching Criminals with Networks'. Jane Arnold from Sir Henry Floyd Grammar School, Aylesbury and James Toyer from Buckingham School introduced graphical calculators that enabled students access to complex number arithmetic and generation of the Mandelbrot set.

Meanwhile Richard Lissaman showed students applications of mathematics in technology with which students are very familiar, such as Google and computer games, in his illustrated session entitled 'Lara Croft and the Scalar Triple Product'.

All presenters gave their sessions three times as students were separated into three groups of about 100 each and moved between sessions. Throughout the day students were actively engaged in areas of mathematics beyond the GCSE specifications and the positive feedback suggested that they had greatly enjoyed their glimpse into what they could be studying in a year or two's time.

Martin Powell, Buckinghamshire FMNC Manager



Mechanics Report

Last summer, the FM Network's central team, in partnership with a group of university academics and with support from the Higher Education Academy Mathematics, Statistics and Operations Research Subject Centre, organised a symposium at the Møller Centre at Churchill College, Cambridge.

The symposium, entitled 'Newton's mechanics: Who needs it?', was motivated by concerns amongst university teachers of engineering, mathematics and physics about the decreasing level of knowledge of Newtonian mechanics amongst new undergraduates. This results in problems in applying mathematics in modelling and problem solving.

The symposium was chaired by Sir Peter Williams and brought together experts from schools, colleges, universities and industry. A series of presentations and discussion groups explored:

- ⇒ *the value of Newtonian mechanics for the teaching and learning of mathematical modelling and problem solving skills;*
- ⇒ *how changes to A level Mathematics have resulted in a reduction in the level and amount of Newtonian mechanics students are now learning at A level;*
- ⇒ *the impact of this reduction on students' preparation for university;*
- ⇒ *practical measures for increasing uptake of mechanics at ages 16-19.*

The symposium report contains a number of recommendations including:

Key recommendation 5:

Schools and colleges offering A level Mathematics should provide access to tuition in both Mechanics 1 and Mechanics 2, either as part of A level Maths or as part of AS/A level Further Maths. Schools and colleges that cannot provide such tuition directly should collaborate with other local schools and colleges, or with external providers, to ensure their students can access tuition.

Recommendation 4.1:

Schools and colleges should ensure that AS/A level Further Maths tuition is available to their students, and university departments should consider encouraging Further Maths in their prospectuses and offers.

The full symposium report was published in January and may be downloaded via the following link: <http://mathstore.ac.uk/repository/NewtonMechReportFinal.pdf>

Stephen Lee, Professional Officer



Recreational Mathematics Past Question Solutions

In the last issue we included three example questions from the MEI 'Maths item of the month'.

Answers

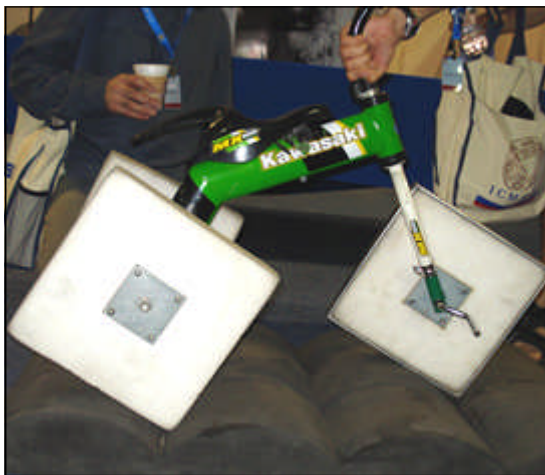
Due to the nature of the questions posed it was not possible to publish detailed solutions within this newsletter. Therefore, please navigate to the following page on the FM Network website:

www.fmnetwork.org.uk/challenge.php

Recreational Mathematics

This interesting problem created great discussion between delegates at the 2008 International Conference on Mathematical Education held in Monterrey, Mexico.

Reinventing the wheel



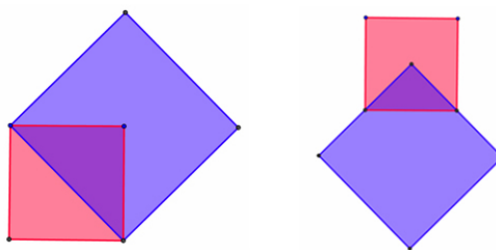
1. Is it possible for a square wheel to move such that the axle remains at a constant height, provided the surface it is "rolling" on is a specific shape?

Can you show that the shape of the surface is *not* an arc of a circle?

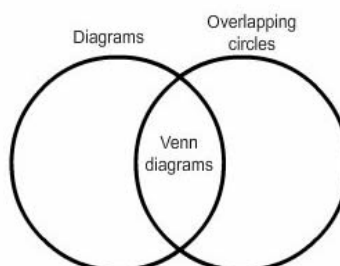
What is the shape of the surface?

2. Can you cover every point on the (x, y) plane with integer coordinates using non-overlapping (or touching) circles of radius 1.3?

3. Given a square, construct another square with double the area using just a straight edge. A straight edge would not allow you to measure a length and transfer this length, nor can you slide the straight edge to create parallel lines; all you can do is use the straight edge to draw a line between two given points. How do you double the area of a square with only a straight edge?



4. No explanation needed for this diagram!



A note of thanks

The success of the Further Mathematics Network is reward for the fantastic efforts of the Further Mathematics Centre Managers, working as a national team with the shared purpose of improving access to mathematics education to young people. The FM Network worked because of the real commitment and dedication of its centre managers, working in partnership with the MEI central team. Sincere thanks are due to the centre managers from the central team, from the students, teachers, schools and colleges they helped to support and from the whole of the mathematics community. Thanks to their efforts, mathematics education at the school/university interface is in a much better position now than it was when the FM Network began work in 2005.

We would also like to thank the many organisations, institutions and individuals who helped to support MEI's tender to manage the Further Mathematics Network's successor, the Further Mathematics Support Programme.

The FM Network Central Team

Contact details

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

Phone: 01225 774777
FAX: 01225 775755

Programme Leader

Charlie Stripp

E-mail: charliestripp@fmnetwork.org.uk

Assistant Programme Leader

Sue de Pomerai

E-mail: suedepomerai@fmnetwork.org.uk

Programme Leader (Industry)

Richard Browne

E-mail: richardbrowne@fmnetwork.org.uk

National Administrator

Janice Richards

E-mail: janicerichards@fmnetwork.org.uk

Administrative Assistant

Valerie Algar

E-mail: valerie.algar@mei.org.uk

Administrative Assistant

Ralph Rutter

E-mail: ralphrutter@fmnetwork.org.uk

Deputy Programme Leader

Richard Lissaman

E-mail: richardlissaman@fmnetwork.org.uk

Professional Officer

Stephen Lee

E-mail: stephenlee@fmnetwork.org.uk

Finance Manager

Dave Griffiths

E-mail: davegriffiths@fmnetwork.org.uk

Administrative Assistant

Sarah Bucknell

E-mail: sarahbucknell@fmnetwork.org.uk

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

www.fmnetwork.org.uk

Let Maths take you Further...