

Mathematics Conference 2010

1 - 3 July

The University of Reading



Guest Speaker Carol Vorderman with
MEI Chief Executive Roger Porkess

A varied programme for all teachers of mathematics

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National Centre
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Teaching of Mathematics



MEI mathematics
conference
for all teachers
for all specifications **2010**

Sponsor of the 2010 Conference 

The 2010 MEI Conference

For this year's MEI conference we are returning to the University of Reading. It will last from Thursday 1st July to Saturday 3rd July and the Saturday will be a full day.

The conference will open with a plenary session devoted to current issues and national developments and there will be opportunities to discuss these throughout, including the changes at GCSE for first teaching in September in Year 10.

Much of the conference will be devoted to workshops, eleven in all, with up to eleven options in each. These cover a wide variety of topics, ensuring that there is always something for everyone.



The first guest lecture, 'Design your own masterclass', will be given by Vinay Kathotia after lunch on the Friday. Until recently Vinay was the Clothworkers' Fellow in Mathematics at the Royal Institution, spending much of his time working on primary and secondary masterclasses. In April this year he took up a new post as Project Head for Mathematics with the Nuffield Foundation. Vinay has run very successful workshops at previous MEI conferences; this year everyone will have the opportunity to be entertained by him.



The next guest lecture, also on Friday afternoon, will be given by Carol Vorderman. Carol is well known for her promotion of mathematics on television. She was the first woman to appear on Channel 4 in 1982 when she started as the 'viral statistician' on Countdown. She continued to calculate her answers quickly for 26 years during which time she has written numerous maths and Sudoku books for children and parents and established her own online maths school www.themathsfactor.com Carol is passionate about mathematics and when she was recently asked to provide advice on what measures would really improve young people's success in learning it, she took it very seriously. In this lecture she will talk about the main recommendations of her report as well as about her love of the subject.



The third "guest" lecturer is not a guest!

After twenty years working for MEI, Roger Porkess is stepping down as Chief Executive and to mark the occasion he will talk about key moments in a life time working in mathematics. His talk will be called "Mathematics: a personal voyage of discovery".

Teachers and lecturers involved in the Further Mathematics Support Programme and the Teaching Further Mathematics (TFM) course will be joining the conference for separate programmes of sessions. For those who would like to know more about these initiatives, the conference provides a good opportunity to talk to those involved. In addition, on the Thursday, the Royal Statistical Society will be holding their half-day conference, integrated with the MEI programme and you will be welcome to go to their sessions which will look at using real statistics in the classroom.

MEI Conference Programme 2010

Thursday, July 1 **Main Programme**

1030 – 1115	Coffee and registration
1115 – 1145	Opening Plenary
1200 – 1300	Session A
1300 – 1400	Lunch
1400 – 1530	Session B
1530 – 1600	Refreshment break
1600 – 1700	Session C
1715 – 1815	Session D
1930 – 2100	Dinner
2115 – 2230	Conference Quiz

Friday, July 2

0830 – 0900	Registration for day delegates
0900 – 1000	Session E
1000 – 1030	Refreshment break
1030 – 1200	Session F
1200 – 1315	Lunch
1315 – 1415	Lecture: Vinay Kathotia
1430 – 1530	Session G
1530 – 1600	Refreshment break
1600 – 1700	Lecture: Carol Vorderman
1700	MEI AGM (all welcome)
1730 – 1830	5-a-side football
1930 – 2100	Conference Dinner

Saturday, July 3

0830 – 0900	Registration for day delegates
0900 – 1000	Session H
1000 – 1030	Refreshment break
1030 – 1130	Lecture: Roger Porkess
1145 – 1245	Session I
1245 – 1345	Lunch
1345 – 1445	Session J
1500 – 1600	Session K
1600	Refreshments and depart

Thursday, July 1						
			1200-1300	1400-1530	1600-1700	1715-1815
			Session A	Session B	Session C	Session D
1	Pure Maths	1115 – 1145 Opening Plenary: National Developments	Multivariable calculus <i>John Cooper</i>	Markov Chains as an enrichment topic accessible to all <i>Richard Lissaman</i>	Pictures and puzzles in teaching A Level Core <i>Bernard Murphy</i>	
2	Mechanics		Using NRICH in A Level Mechanics <i>Stephen Hewson</i>	Techniques to engage students in Mechanics <i>Professor John Berry</i>	Misconceptions in Mechanics <i>Ted Graham</i>	Simple Practical Activities in Mechanics <i>Ted Graham</i>
3	Statistics			Binomial and Normal Distributions: ideas for teaching <i>Stella Dudzic</i>	RSS - Bringing <i>Significance</i> to the Classroom	RSS - Bringing <i>Significance</i> to the Classroom
4	Decision			How to make Decision Maths exciting <i>Sue de Pomerai</i>		
5	Resources & ICT		Getting the most out of the MEI online resources <i>Catherine Berry</i>	My favourite topics in Autograph for Pure Mathematics <i>Douglas Butler</i>	Using handheld Technology to support pupils' understanding <i>Jenny Orton</i>	Beyond the Textbook: resources and ideas for S1 & S2 <i>Sidney Tyrrell</i>
6	General		Maths in the diplomas <i>Richard Browne</i>	Bridging the GCSE to A level gap <i>Pat Morton</i>	Assessment for Learning at A Level (ideas from the revision guides & beyond) <i>Stella Dudzic</i>	What's new and exciting on the web <i>Douglas Butler</i>
7	KS3 & KS4		What's new about GCSE from 2010? <i>Stella Dudzic</i>		Ask the Examiner: Additional Mathematics <i>Michael Ling</i>	Exploring applications with a calculator <i>Stella Dudzic and Chris Longhurst</i>
8	Enrichment		Number Theory: Links to the School Curriculum <i>Oscar Gregan</i>	(Crop) Circle Constructions <i>Garrod Musto</i>	Topics in Undergraduate Mathematics: Continuity and Differentiability <i>Andrew Rogers</i>	Preparing for STEP Mathematics 1 & 2 <i>Peter Mitchell</i>
9	Just for Fun		Analysis of mathematical games: a masterclass <i>Bernard Murphy</i>	Polyominoes: a Year 6/7 masterclass <i>Bernard Murphy</i>	Risk and Probability in the Classroom – Part 1 <i>Nadia Baker</i>	Risk and Probability in the Classroom – Part 2 (Gameshow) <i>Nadia Baker</i>
10	MEI specific		MEI's current work <i>Roger Porkess</i>	Investigation of Curves <i>Roger Porkess and Chris Longhurst</i>	C3 Coursework <i>Val Hanrahan</i>	C4 Comprehension <i>Val Hanrahan</i>
11	OCR specific			Ask the Examiner: Core Mathematics <i>John Waller</i>	Ask the Examiner: Probability and Statistics <i>Owen Toller</i>	MEI specific: Feedback on and data from the January MEI exams <i>Keith Proffitt</i>

Friday, July 2						
		0900-1000	1030-1200			1430-1530
		Session E	Session F			Session G
1	Pure Maths	Big ideas in Core Mathematics <i>Martyn Parker</i>	Approaches to teaching algebraic concepts at A Level <i>Richard Lissaman</i>	1315 – 1415 Lecture: Vinay Kathotia	Engaging weaker students in Core Mathematics <i>Phil Chaffe</i>	
2	Mechanics	Practical Mechanics <i>Rod Bond/Ria Symonds</i>	The Virtual Physical Laboratory <i>John Nunn</i>			
3	Statistics	A taster session in Statistics for Yr 11 students <i>Stella Dudzic</i>	Big ideas in Statistics <i>Gerald Goodall</i>			
4	Decision	Engaging weaker students in Decision Maths <i>Jeff Trim</i>	Hands on activities: Decision Maths <i>Jeff Trim</i>		Decision Maths: Progression for students to university and careers <i>Steve Russ/Marcin Jurzinski</i>	
5	Resources & ICT	The National STEM Centre Resources <i>Tom Button</i>	My favourite topics in Autograph for applied mathematics <i>Douglas Butler</i>		MathCentre and MathTutor Resources Revitalised <i>Liz Meenan</i>	
6	General		Maths in the workplace <i>Richard Browne</i>		The M in STEM <i>Tom Button</i>	
7	KS3 & KS4	Functional Mathematics <i>Richard Browne</i>			GCSE retakes - Strategies for Engagement <i>Sally Barton</i>	
8	Enrichment	Some ideas on limits and convergence <i>David Bedford</i>	I do, I understand <i>Vinay Kathotia</i>		Roll once round the boundary to measure the area: planimeters <i>Chris Sangwin</i>	
9	Just for fun		Mathematical Paperfolding <i>Tom Bunting</i>		Proofs without words <i>Stella Dudzic</i>	
10	MEI specific	Ask the Examiner: Mechanics <i>David Holland</i>	Ask the Examiner: Core <i>Mike Dixon</i>		Introducing key topics in Numerical Methods <i>Richard Lissaman</i>	
11	AQA specific	Ask the Examiner: Statistics <i>John White</i>	Ask the Examiner: Mechanics <i>Ted Graham</i>		Ask the Examiner: Core & Decision <i>Neil Buckley</i>	
				1600 – 1700 Lecture: Carol Vorderman		

Saturday, July 3						
		0900-1000		1145-1245	1345-1445	1500-1600
		Session H		Session I	Session J	Session K
1	Pure Maths	Six new gems that every teacher of C3 & C4 should know. <i>Richard Lissaman</i>	10.30 – 11.30 Lecture: Roger Porkess		Six gems that every teacher of Further Pure should know <i>Chris Saker</i>	An introduction to Group Theory <i>Sue de Pomerai</i>
2	Mechanics	A taster session in Mechanics for Yr 11 students <i>Jane West</i>		Ideas for teaching Moments <i>Charlie Stripp/ Stephen Lee</i>		Ideas for teaching circular motion <i>Charlie Stripp/ Stephen Lee</i>
3	Statistics			Teaching Statistics - a practical approach <i>Mark Kent</i>	Teaching Statistics through problem solving <i>Neil Sheldon</i>	Teaching <i>t</i> tests <i>Neil Sheldon</i>
4	Decision	Decision Maths: Why offer it? <i>Sue de Pomerai</i>				A taster session in Decision Maths for Yr 11 students: Join the Dots! <i>Sharon Tripconey</i>
5	Resources & ICT	GeoGebra Masterclass <i>Michael Borchers</i>		GeoGebra for beginners <i>Bernard Murphy</i>	GeoGebra in Mechanics <i>Tom Button</i>	GeoGebra in Further Mathematics <i>Bob Francis</i>
6		An introduction to the NCETM Portal <i>Fiona Allan</i>		What does the NCETM Portal offer Heads of Departments? <i>Fiona Allan</i>	Personal Learning on www.ncetm.org.uk <i>Fiona Allan</i>	NCETM Teacher Enquiry Funded projects <i>Fiona Allan</i>
7	KS3 & KS4	GCSE Maths: Interactive Lesson Ideas <i>Adam Boddison</i>		Number and Shape Activities for the British classroom based on Realistic Mathematics Education <i>Sue Hough</i>	Using Algebra and Data Activities based upon Realistic Mathematics Education in the British classroom <i>Sue Hough</i>	What does progress look like in Realistic Mathematics Education compared with other approaches? <i>Sue Hough</i>
8	Enrichment	Advanced extension Award (AEA): Enriching and supporting students <i>Sharon Tripconey</i>		The Fibonacci Sequence and Right Angled Triangles <i>Tom Owens</i>	Inversion – Geometry on its head <i>Simon Dakeyne</i>	Preparing for STEP Mathematics 3 <i>Peter Mitchell</i>
9	Just for fun	Mathematics of Juggling <i>Chris Saker</i>		Mathemagical <i>Ian Vallance</i>	Problem-Solving Strategies in the Magic Mathworks Travelling Circus <i>Paul Stephenson</i>	Problem-Solving Strategies in the Magic Mathworks Travelling Circus <i>Paul Stephenson</i>
10	MEI specific	Ask the Examiner: FP1 <i>Charlie Stripp</i>		Ask the Examiner: Statistics <i>Bob Francis</i>	Ask the Examiner: Decision <i>Sue de Pomerai</i>	Numerical Methods Coursework <i>Richard Lissaman</i>
11	Edexcel specific			Ask the Examiner: Core <i>Greg Attwood</i>	Ask the Examiner: Applied <i>Greg Attwood</i>	Ask the Examiner: AEA <i>Greg Attwood</i>

Session Choices

Session A. Thursday 1200 - 1300

1. Multivariable Calculus. John Cooper

Multivariable Calculus is an accessible topic for all FP3 students. This session will clarify the concept of differentiation for functions of more than one variable and should be useful for new or experienced teachers who are considering teaching this popular chapter for the first or the nth time.

2. Using NRIC in A Level Mechanics. Stephen Hewson

We will look at some of the rich mathematical tasks from the NRIC website which might support the teaching and learning of A level mechanics. The session will include discussion of the issues surrounding the learning of mechanics as well as time to try out some of the problems. Suitable for reflective teachers looking to enrich the teaching of mechanics.

5. Getting the most out of the MEI online resources. Catherine Berry

The session will look at how the resources, particularly new features such as forums, can be used in teaching. There will also be a look at future developments, and there will be an opportunity for suggestions and feedback. This session is suitable for teachers who are already using the MEI online resources.

6. Maths in the diplomas. Richard Browne

This session will give an overview of the new diplomas and will describe the role of mathematics in diplomas. It will then focus in more detail on the advanced Engineering Diploma, which contains a compulsory mathematics unit. We will look at the MEI online learning resources for the course, past papers, and the Royal Academy of Engineering exemplar material.

7. What's new about GCSE from 2010? Stella Dudzic

GCSE Mathematics specifications are changing for teaching from September 2010. This session will cover changes to examinations and teaching ideas. It is suitable for teachers of all GCSEs in Mathematics, including the twin pilots.

8. Number Theory: Links to the School Curriculum. Oscar Gregan

An enrichment topic: complementing the 2009 MEI conference "Brush up on your number theory", the session will examine how topics like prime numbers and factors, terminating and recurring decimals, Pythagorean triples, and Fibonacci sequences can lead on to ideas in the theory of numbers.

9. Analysis of mathematical games: a masterclass. Bernard Murphy

I place a die face up on a table. You and I take it in turns to rotate the die about one of the bottom edges and so bring a new number uppermost. The loser is the one to take the running total past 40. What strategy should I adopt to win? In this session we'll play and then analyse a few games like this and describe others I've used in masterclasses with KS3 pupils.

10. MEI's current work. Roger Porkess

In this session I will outline the work that MEI is currently carrying out. There will be plenty of opportunity for discussion, both of what is being presented and of ideas that delegates put forward at the time. This session is suitable for everyone.

Session B. Thursday 1400 - 1530

1. Markov Chains as an enrichment topic accessible to all. Richard Lissaman

Markov Chains is a beautiful application which brings together statistics in the form of probability with pure mathematics in the form of matrices. Generally, students of mathematics have to study to quite a high level before they meet Markov Chains. This session will demonstrate how Markov Chains can be used to motivate and stimulate all students in their study of mathematics. Markov Chains is a topic ideally suited to mathematical enrichment. It's accessible to all and it can show students exactly how powerful a tool mathematics can be. If you have a calculator with matrix functionality please bring it along!

2. Techniques to engage students in Mechanics. Professor John Berry

This session is designed for teachers who will be teaching Mechanics for the first time as well as those who are looking for ideas to further engage their students in learning. The session will require active participation of teachers in discussion of concepts, practical activities and the big ideas in Mechanics!

3. Binomial and Normal Distributions: ideas for teaching. Stella Dudzic

This session will look at ideas for teaching Binomial and Normal distributions in S1 and S2 units. It is suitable for teachers of all A Level specifications; it will be particularly helpful for teachers who are fairly new to teaching statistics but there may be some new ideas for more experienced teachers.

4. How to make Decision Maths exciting. Sue de Pomerai

Practical activities, background, ideas and anecdotes to show how Decision Maths relates the world of work and to other branches of maths. Have some fun whilst developing the modelling skills needed for success in Decision Maths. This session is suitable for teachers who have some experience of teaching Decision Maths.

5. My favourite topics in Autograph for Pure Mathematics. Douglas Butler

A look at some well tried lesson plans for incorporating Autograph in transformations; vectors, lines and planes (2D and 3D); areas and volumes; introducing 'e'; exploring trig functions and inverse functions. This session will also include how to save an Autograph file to the web for the Player.

6. Bridging the GCSE to A Level gap. Pat Morton

Is transition between KS4 and KS5 smooth for your students or is it a significant gap? This session will explore ways to bridge this gap from above and from below. It will be an activity based session looking at teaching and learning resources and methods which can extend KS4 students and support KS5 students, ensuring that the transition is as smooth as possible.

8. (Crop) Circle Constructions. Garrod Musto

Ever been asked by a student "when will I ever use circle constructions in my daily life," and truthfully not sure how to respond? This session is for you! It is aimed at teachers of KS4 wishing to add a little colour into the topic, and offer some scope for cross curricular work. During the talk I intend to focus on aspects of the geometry of circles, and how the phenomenon of crop circles can be used in the classroom (or a farmer's fields!) to explicitly explore the compass constructions and circle theorems found within the Key stage 4 framework. Delegates attending will receive a CD containing all the resources and presentations to enable you to try this out in your own schools.

9. Polyominoes: a Year 6/7 masterclass. Bernard Murphy

Polyominoes are 2D shapes made by joining congruent squares edge to edge. In this masterclass pupils look at some of the mathematics related to polyominoes: Can the five tetrominoes form a rectangle? How can you be sure that you've found all the pentominoes? What if you use equilateral triangles rather than squares (and what's special about a Penrose wheelbarrow)?

10. Investigation of Curves. Roger Porkess and Chris Longhurst

Investigation of curves is an option within FP2 but it is also a fascinating source of enrichment material accessible to a wide range of A Level students. This session will explore how using a graphical calculator can enable students to gain greater insight into functions.

11. Ask the Examiner: Core Mathematics (OCR). John Waller

A session particularly suitable for new teachers who wish to learn something of the examining process. Using examples from C3 and C4, the session will concentrate mainly on C1 and C2 and involve topics such as understanding a mark scheme and common errors shown by candidates in examinations.

Session C. Thursday 1600 - 1700

1. Pictures and puzzles in teaching A Level Core. Bernard Murphy

In this session we will look at a selection of puzzles which depend on ideas from AS and A2 Core Maths and which are accessible to A Level students of a wide range of abilities. Some are designed to help

students understand mathematical concepts through pictures, others to practise technique with answers that are meaningful to the students; they should be able to decide for themselves if they've got them right.

2. Misconceptions in Mechanics. Ted Graham

This session is suitable for any teachers of mechanics who would like to try to develop a deeper level of conceptual understanding in their pupils.

3. RSS - Bringing Significance to the Classroom.

'Bringing *Significance* to the Classroom' is an offline project which helps to make Statistics teaching more relevant and more reflective of the way in which data are used in the real world. Join us at our CPD showcase event for teachers at KS3 and KS4 and experience at first hand two further taught taster sessions using *Significance*-inspired materials, hear about the problem solving approach to data handling and about real-data, real context teaching. Sessions will include: 'Forecasting Human Sporting Achievement' a session (looking at the 2008 Olympics, how much faster can athletes get? is it possible to forecast future sporting achievement from past results? Etc) for teachers of KS3 students, and 'Time is Right', a phenology-focused (the timing of natural events from flowering, migration to spawning and nesting and the statistics of climate change) session for teachers of KS4 students

5. Using handheld Technology to support pupils' understanding. Jenny Orton

In this hands-on session we will look at activities which use TI-Nspire on handhelds to support the development of pupils' understanding. Examples from both KS4 and post 16 will be included. No prior knowledge of the TI-Nspire software is needed, but a free software download is available from the Texas Instruments website: handhelds will be available for the session

6. Assessment for Learning at A Level (ideas from the revision guides & beyond). Stella Dudzic

This session will look at assessment for learning at A Level and concentrate on practical suggestions. The MEI revision guides contain multiple choice questions with explanations of errors and correct solutions; their use for assessment for learning will be considered as part of the session.

7. Ask the Examiner: Additional Mathematics. Michael Ling

After a preliminary presentation, Michael will invite delegates to comment on and ask questions about the 2010 examination. Since this is the first of these sessions at an MEI conference, Michael will allow discussion of examinations of previous sessions if there is time. Notice would be appreciated so that the appropriate material may be prepared.

8. Topics in Undergraduate Mathematics: Continuity and Differentiability. Andrew Rogers

A fun look at a topic which struck fear into generations of undergraduates! Explore all those epsilons and deltas with a little help from Professor E. McSquared and his friends.

9. Risk and Probability in the Classroom – Part 1. Nadia Baker

This first of a two part interactive session will provide teachers with fun and engaging activities for teaching risk and probability. There will be a focus on bridging the gap between classroom mathematics and the real-world. The ideas shared will be a collaboration of the Millennium Mathematics Project and the Winton Programme of the Public Understanding of Risk, based at the University of Cambridge. This session is suitable for teachers with students of any age and ability as the activities will range in levels of difficulty

10. C3 Coursework (MEI). Val Hanrahan

There has been little change in the requirements of this task over recent years, but developments in ICT have provided more opportunities for candidates. The session will look at ways of maximising the opportunities for student learning while satisfying the coursework criteria. It will be suitable for teachers with little or no experience of this task.

11. Ask the Examiner: Probability and Statistics (OCR). Owen Toller

Session D. Thursday 1715 –1815

2. Simple Practical Activities in Mechanics. Ted Graham

This is suitable for any teacher of mechanics who would like some simple, low cost suggestions for building practical activities into their mechanics lessons.

3. RSS.

(See Session C3)

5. Beyond the Textbook: resources and ideas for S1 & S2. Sidney Tyrrell

A broad ranging session using practical resources, and ideas, including real data sets and web sites which will be provided on CD. Suitable for any teacher looking for something different for S1 and S2.

6. What's new and exciting on the web. Douglas Butler

Douglas makes a point of trying to keep up to date with the ever changing scene of web resources for mathematics teaching: Jing, Google Earth, sources of images and data, and not to mention (of course) what will emerge between now and July!

7. Exploring applications with a calculator. Stella Dudzic and Chris Longhurst

This session will look at applications of mathematics which can be used in teaching and explore how the use of calculators can allow students to gain insights into real life situations where mathematics is used. It is inspired by the content of the Applications of Mathematics pilot GCSE but suitable for all teachers of courses at GCSE level.

8. Preparing for STEP Mathematics 1 & 2. Peter Mitchell

This session is addressed at teachers who hope to prepare students for STEP Mathematics; it will focus on some of the mathematical issues raised in the questions, particularly from Maths 1 and 2, with a chance to try a question. The session is complementary to the corresponding one on Maths 3.

9. Risk and Probability in the Classroom – Part 2 (Gameshow). Nadia Baker

This second of a two part session will involve participation in a fun and interactive gameshow 'Who Wants to be a Mathionaire?' Delegates will use hand-held technology to respond to multiple choice challenges based on risk, probability, problem solving and lateral thinking that can be taken away and used in future lessons. Delegates are not excluded from attending this session if they did not attend the first part, and it will be suitable for teachers with students of any age and ability.

10. C4 Comprehension (MEI). Val Hanrahan

The comprehension task is designed to test the key skills of reading and comprehending a short mathematical article. This session will look at some examples of past pieces, suggestions for preparing students for the component and a description of the resources offered by MEI. It will be suitable for teachers with little or no experience of this component.

11. Feedback on and data from the January MEI exams. Keith Proffitt

Feedback on exam papers submitted to MEI is very useful. How does OCR make use of it? What effect does it have on future papers? These questions will be addressed in the context of the January 2010 Core papers, and will include an insight into the data that is available when papers are marked on screen.

Session E. Friday 0900 – 1000

1. Big ideas in Core Mathematics. Martyn Parker

Where does Core Mathematics lead? This session will show how simple ideas in core mathematics at school and college level give us insight into the real world. We will provide enrichment ideas to motivate students to study mathematics.

2. Practical Mechanics. Rod Bond/Ria Symonds

This session will give delegates the opportunity to experience practical tasks designed for KS3,4 and 5 students as a way of generating interest in and an understanding of Mechanics.

3. A taster session in Statistics for Yr 11 students. Stella Dudzic

This session will be a demonstration of a taster session that could be used with year 11 students either to give them an idea of what statistics at A Level includes or as an enrichment session. It is suitable for teachers from colleges who are working with 11-16 schools and for teachers of GCSE.

4. Engaging weaker students in Decision Maths. Jeff Trim

This session will offer current or new teachers of Decision Mathematics a range of resources and ideas for making graph theory more accessible to weaker students.

5. The National STEM Centre Resources. Tom Button

The National STEM Centre in York is building the largest collections of resources for teachers of Science, Technology, Engineering and Mathematics in the UK. The collections contain both contemporary and archive materials. Any teacher in the UK is welcome to visit the resource collection in person and many of the resources are available freely online. In this session the online collection and a number of the resources will be demonstrated. This session is appropriate for all teachers.

7. Functional Mathematics. Richard Browne

The session will look at functional mathematics, considering what is expected by the Ofqual criteria and how this is realised by the new specifications. We will also look at the role of functional mathematics in relation to GCSE Mathematics. The main focus of the session will be Level 2.

8. Some ideas on limits and convergence. Dave Bedford

The idea of a limit underpins much of mathematics and is central to many of the ideas developed at A Level. In this talk we will look at how it is treated explicitly; where it appears implicitly; and how the informal ideas of limits can be introduced earlier on. The talk will be aimed at anyone familiar with the content of the A Level core (there will be no epsilons or deltas!). I will include some topics simply because I think they are fun, in particular you should expect to see some overhanging bricks and a barrel containing infinitely many balls. Please note that this talk will be similar to the talk I gave at BCME-7 in Manchester.

10. Ask the Examiner: Mechanics (MEI) David Holland

We shall consider the candidates' responses to the Mechanics papers of recent years, with particular reference to M1. The emphasis will be on things commonly done well or poorly over several examination sessions and the implications for our teaching. Where possible, examples will be given from papers sat in 2010.

11. Ask the Examiner: Statistics. (AQA) John White

The session will concentrate on the performances of candidates in this June's S1 and S2 papers. I will highlight questions and topics which candidates found accessible and those which they found challenging. Delegates will be invited to discuss reasons for the latter and so are encouraged to have prepared their own points for discussion. The session will be useful to all those teaching the S1 and S2 modules. I will also be prepared, probably outside the session, to answer questions on this June's S3, S4 and SS02 to SS06 papers.

Session F. Friday 1030 – 1200

1. Approaches to teaching algebraic concepts at A Level. Richard Lissaman

Many people's experience of algebra is as an exercise in symbol manipulation which is often devoid of meaning and understanding. There are lots of potential areas for misunderstanding in algebra. For example, the idea that a letter often represents a specific unknown when solving an equation but can represent a generalised number at other times can cause much confusion in students. This session will explore these ideas in the teaching and learning of algebra as well as provide lots of practical tips for presenting algebra in the classroom.

2. The Virtual Physical Laboratory. John Nunn

A demonstration of the Virtual Physical Laboratory will be given. The resource is intended to help students of physics (mathematics and electronics) from year 10 to 1st year University. It comprises over 220

interactive simulations as well as virtual experiments. Teachers attending the presentation will be given a complimentary license to use the resource in their schools.

3. Big ideas in Statistics. Gerald Goodall

Statistics is about the real world - about real problems, about variability, about uncertainty, about modelling, about interpretation. We will explore some of these big things in a big way. Anyone who wants to open their minds a bit is welcome, whether new to the subject or already highly experienced.

4. Hands on Activities: Decision Maths. Jeff Trim

Resources will be demonstrated for a range of Decision Maths topics, including Graph Theory, Sorting algorithms and Bin-Packing. It is suitable for all teachers of D1. This is a repeat of the session offered last year.

5. My favourite topics in Autograph for applied mathematics. Douglas Butler

How to make the most of the statistics and probability features in Autograph; bringing mechanics lessons to life with a dynamic look at vectors (closest distance 2D and 3D), projectiles (with velocity and acceleration vectors) and differential equations (1st and 2nd order).

6. Maths in the workplace. Richard Browne

I will work with one (or perhaps two) STEM ambassadors who will give brief presentations explaining how they use mathematics in an aspect of their work. The work involved will be in an industrial rather than an educational context. There will be an opportunity to work with other teachers and the ambassador(s) to consider ways to introduce information about this context into mathematics lessons. The mathematics is intended to be at about A Level standard.

8. I do, I understand. Vinay Kathotia

"I hear, I forget; I see, I remember; I do, I understand", a proverb attributed to a Chinese carpenter, applies equally well to learning and teaching mathematics. This session will have us doing mathematics, in a variety of ways, and experience will hopefully lead to better understanding. Relevant and suitable for all teachers and learners, across age and ability spectra.

9. Mathematical Paperfolding. Tom Bunting

An enormous amount of the mathematics we teach has its roots in Euclidian Geometry, which itself is based on straight edge and compass constructions. Folding a piece of paper is the equivalent of creating a straight edge, so paper folding could be used in vast areas of mathematics. This session will look paper folding basic angle constructions, isometric paper, plaited polyhedra, a bit of iteration and a couple of surprises. This is a practical, hands on session, suitable for any teachers with an interest in looking at mathematics in an entertaining and slightly different way. As purists in paper folding we won't be using scissors or glue and we may even end up dispensing with the paper. If you would like any further information email: tom.bunting@localdial.com

10. Ask the Examiner: Core (MEI) Mike Dixon

A resume of the summer exam papers, particularly C2 and C3. Most useful to teachers who are in their first few years of preparing candidates.

11. Ask the Examiner: Mechanics (AQA). Ted Graham

This session will highlight some of the difficulties that candidates have had with recent mechanics examination papers and give delegates the chance to ask questions. The main focus will be on M1 and M2, but questions on any mechanics module will be welcome.

Session G. Friday 1430 - 1530

1. Engaging weaker students in Core Mathematics. Phil Chaffe

This session is aimed at all teachers who are involved in delivering the Core Mathematics modules but is particularly aimed at those who are relatively new to teaching at AS/A level. The session will focus on principles of delivery, including the use of a variety of learning styles, interactive activities based around the most commonly used software packages and how to develop students' learning strategies.

4. Decision Maths: Progression for students to university and careers. Steve Russ/Marcin Jurdzinski

Steve Russ and Marcin Jurdzinski both lecture a new degree course, Discrete Mathematics, at Warwick University. This session will provide invaluable information about progression for students and mathematical content in this exciting new area. Specifically the session will describe what Discrete Mathematics is at university and its relationship to mathematics and computer science. There will be a chance to look at some example material and examination questions from first year modules in the Discrete Mathematics degree course and to delve a little deeper into some of the material in A level Decision mathematics modules. The session will also provide information about which students a degree in Discrete Mathematics is appropriate for, both in terms of pre-requisite knowledge from A level Mathematics and Further Mathematics and in terms of personal interests and skills. Finally the session will address where a degree in Discrete Mathematics is likely to lead to for students. The session will include time to ask Steve and Marcin about any aspects of Discrete Mathematics and to discuss the relationship between discrete maths at school/college and at university.

5. MathCentre and MathTutor Resources Revitalised. Liz Meenan

MathCentre and MathTutor resources (well known free online resources which include videos, diagnostics, notes, activity sheets and exercises) have been revitalised and relaunched this year with some upgrades. These two sites have a brand new look and feel. Come along to this session and see what the changes are.

6. The M in STEM. Tom Button

This session will be an open discussion about the role of mathematics within STEM. Amongst the points to be discussed are:

- Is STEM just a collection of related subjects?
- Are there any benefits in coordinating STEM teaching?
- Is it limiting to just look for Science, Technology and Engineering applications of Mathematics?
- What do Mathematics teachers have to offer teachers of Science, Technology and Engineering?
- Is Mathematics only of use when it can be applied?

All opinions will be welcome! This session is appropriate for all teachers, especially those who are considering, or have experience of, collaborating across STEM subjects.

7. GCSE retakes - Strategies for Engagement. Sally Barton

This will be a session on sharing approaches to successfully engage resit students. At Regent the aim was to give students success and opportunities for progression. I will introduce the options that Regent have tried since the loss of the intermediate tier and the adjustments we have made. It would be good to hear what other colleges have done and the results obtained both in terms of student attitudes and exam results. The session will include examples of FSMQ projects developed at Regent for the GCSE Use of Maths qualification. GCSE Use of Maths will not continue but could its FSMQs offer ways of engaging your students and giving them success on the way to the traditional GCSE?

8. Roll once round the boundary to measure the area: planimeters. Chris Sangwin

What, if any, is the connection between the perimeter of a plane shape and its area? This talk will explain how to measure the area of a plane shape by tracing one around the perimeter, using only a simple tool made from a bent coat hanger. This device is known as a "planimeter", and there are various forms of this

analogue device. The talk will present a justification using only elementary geometry, but will also hint as how to use higher calculus and Green's Theorem in the plane.

9. Proofs without words. Stella Dudzic

Proof is an important concept in mathematics. This session will look at visual ways of seeing why a result must be true rather than writing out a formal proof. It is suitable for all A Level teachers and will also include some things for Higher tier GCSE.

10. Introducing key topics in Numerical Methods (MEI). Richard Lissaman

Numerical methods play an extremely important part in modern applications of mathematics. Applications in computing often trade getting a speedy approximation to a value for taking longer to get an exact value. In teaching Numerical Methods, it's easy to put too much focus on applying the formula associated with the methods themselves. There are many more mathematical skills that students need to acquire for success and to maximise their enjoyment of this module. This session will explore these as well as looking at ways to motivate and engage students in this important module.

11. Ask the Examiner: Core & Decision (AQA). Neil Buckley MBE

Question and answer session re the Summer AQA papers, suitable for those new to teaching the subject, teachers who want to stretch their highest achieving students and teachers who are interested in how GCE Mathematics is developing from an examiner's point of view and how to ensure their students gain full credit for their ability. Further Pure can be included if there is a demand. I would very much appreciate information from delegates about the issues they would want me to cover in time for me to prepare for the meeting. Please email: NeilBuckley4@ntlworld.com

Session H. Saturday 0900 - 1000

1. Six new gems that every teacher of C3 & C4 should know. Richard Lissaman

Students meet many big mathematical ideas in C3 and C4. They will meet the chain rule; integration by substitution; functions as mathematical objects in their own right and numerical methods. They'll deepen their understanding of the exponential, logarithmic and trigonometric functions. This session will provide some original ideas for presenting and engaging students across all of these topics. It will explore links between these topics and also attempt to provide ideas to help students make connections between the mathematics they are learning in C3 and C4 and the real world.

2. A taster session in Mechanics for Yr 11 students. Jane West

The session will be suitable for teachers who wish to encourage their year 11 students to study A level Mathematics and in particular Mechanics. It will include ideas for practical activities relevant to sixth form Mechanics

4. Decision Maths: Why offer it? Sue de Pomerai

What's the point in offering Decision Maths? A quick guide to how the techniques learned in D1 and D2 are used in the world of work.

5. GeoGebra Masterclass. Michael Borchers

This session will show some tips and tricks that allow you to create advanced demonstrations/animations in GeoGebra. The session will have some flexibility to accommodate delegates' interests but will include:

- the spreadsheet
- creating randomised examples (with answers!)
- the Sequence command

6. An introduction to the NCETM Portal. Fiona Allan

We will start by looking at some of the micro sites, the off the shelf PD activities and the resources on www.ncetm.org.uk for secondary maths teachers. There will then be an opportunity to explore www.ncetm.org.uk for yourself.

7. GCSE Maths: Interactive Lesson Ideas. Adam Boddison

This session will explore a range of activities designed to make GCSE maths more exciting. It will include ideas on how to use Google Earth and other freely available resources to enhance the teaching and learning of mathematics. The session will also feature some mathematical magic tricks, which teachers can utilise in the classroom.

8. Advanced extension Award (AEA): Enriching and supporting students. Sharon Tripconey

The Advanced Extension Award (AEA) in mathematics is a qualification designed to challenge and differentiate between the most able Advanced Level candidates and will continue to be available at least until June 2012. The qualification is accessible to all able candidates, whatever specification they're studying, as it is based on A Level subject criteria rather than individual specifications. The session will outline a brief history of the qualification and a description of what the papers aim to achieve. The focus of the session will be on how teachers can help students to become more independent in tackling these papers; using past questions to illustrate recurring themes with ideas of how questions can be used as enrichment in A Level teaching.

9. Mathematics of Juggling. Chris Saker

In this talk we look at how we can use Mathematics to model juggling. This talk is primarily a fun look at an application of Mathematics but we will also see the subject matter can be linked to parts of the A-level syllabus and how you can use this material in your classroom even if you cannot juggle.

10. Ask the Examiner: FP1 (MEI). Charlie Stripp

Session I. Saturday 1145 - 1245

2. Ideas of teaching Moments. Charlie Stripp/Stephen Lee

This session explores ways to teach moments, including the use of contexts and simple experiments to bring the topic to life!

3. Teaching Statistics - a practical approach. Mark Kent

The session will involve a discussion and demonstration of practical approaches to teaching Statistics and is open to anyone who wishes to pick up new ideas in this area and/or is willing to share their own experiences. It will be a hands-on session and almost certainly involve the consumption of chocolate at some stage!

5. GeoGebra for beginners. Bernard Murphy

This session will be appropriate for those teachers who are new to Geogebra. By the end of the session you will be able to create dynamic worksheets using the geometric and algebraic features of Geogebra, incorporating slider bars and, if we've time, dynamic text boxes. (This is a repeat of my session at the 2009 MEI conference).

6. What does the NCETM Portal offer Heads of Departments? Fiona Allan

We will start by looking at what the NCETM Portal can offer Heads of Departments in secondary schools. After a short introduction, there will be an opportunity to explore the relevant sections of the Portal for yourself, and then in small groups, to think about how you might use these resources with your department.

7. Number and Shape Activities for the British classroom based on Realistic Mathematics Education. Sue Hough

This session will focus on the use of context and models as a means of enabling students to simultaneously learn procedures and solve problems in Number and Shape. Participants will be involved in trying questions, sharing methods and linking what they have done to the use of contexts and models. These resources have been trialled in several Manchester secondary schools, some reference to these pilots will be made during the session. Suitable for: Teachers who wish to develop a problem solving approach within their classroom.

8. The Fibonacci Sequence and Right Angled Triangles. Tomi Owens

Get a little more out of some very familiar triangles. Useful for high achieving GCSE students or AS / A2 students. Should get students thinking and maybe even arguing with their teacher! Fits naturally into Core 2. Lots of trigonometry and some proof.

9. Mathemagical. Ian Vallance

Some great maths starters using magic tricks. You will be taught how to do SOME of the tricks and where to buy others from. You will then learn how these tricks can be used as an introduction to shape (volume and surface area) number (prime numbers, binary and golden ratio) data handling (probability) and Algebra (making and solving formula).

10. Ask the Examiner: Statistics (MEI). Bob Francis

The session will concentrate on the performance of students in the MEI Statistics 1 and Statistics 2 papers, highlighting topics where students did well or areas which students found challenging. This session will be particularly useful to those who are teaching either module for the first time. Delegates will have the opportunity of asking any questions about preparing students for these papers.

11. Ask the Examiner: Core (Edexcel). Greg Attwood

This is an opportunity to ask questions of one of Edexcel's Chief Examiners about the core mathematics units. It is suitable for any teachers interested in the Edexcel core examinations.

Session J Saturday 1345 – 1445

1. Six gems that every teacher of Further Pure should know. Chris Saker

This session is aimed at anyone who is currently teaching or is interested in teaching Further Pure Mathematics and aims to introduce and provide an opportunity to discuss way to enrich and extend Further Pure Mathematics lessons.

3. Teaching Statistics through problem solving. Neil Sheldon

The Royal Statistical Society Centre for Statistical Education is running a course for teachers who wish to enhance their confidence and/or competence to teach statistics successfully. The course involves a mixture of workshop days and distance learning under the guidance of a tutor. Successful completion of the course leads to the award of the Certificate in Teaching Statistics up to Pre-university Level. In this session Neil Sheldon will give an overview of what the RSSCSE course offers. He will also present a few challenging ideas which you could use as a diagnostic to see if you would benefit from the course.

5. GeoGebra in Mechanics. Tom Button

Geogebra is a dynamic-geometry/graph plotting package that demonstrates the link between geometry and algebra. This makes it excellent for demonstrating dynamic models in mechanics. It reinforces both the algebra and the geometry used in mechanics. Delegates will have an opportunity to explore some of the opportunities offered by the software such as interactive force diagrams, using time as a variable and animations. This session is appropriate for all teachers of mechanics and all levels of experience of using ICT.

6. Personal Learning on www.ncetm.org.uk. Fiona Allan

The Personal Learning Space provides each registered portal user with their own private area of the site where they can organise their professional learning and development. This space is an excellent place to make notes and reflections on resources and materials, collect evidence for use in your career progression, store links to your favourite portal items and quickly access your own contributions. It also includes the all-important Self-evaluation Tools. The session will start with a brief introduction to the Personal Learning Space and then you will be able to explore it further online. This session is suitable for all.

7. Using Algebra and Data Activities based upon Realistic Mathematics Education in the British classroom. Sue Hough

This session will focus on the use of context and models as a means of enabling students to simultaneously learn procedures and solve problems in Algebra and Data. Participants will be involved in trying questions, sharing methods and linking what they have done to the use of contexts and models.

These resources have been trialled in several Manchester secondary schools, some reference to these pilots will be made during the session. Suitable for: Teachers who wish to develop a problem solving approach within their classroom.

8. Inversion – Geometry on its head. Simon Dakeyne

This session will investigate the transformation known as Inversion, using a wide variety of mathematical tools, from paper and pencil, through Geometer's Sketchpad to Polar Coordinates and Complex Numbers. There will be a choice of activities on a handout, so that attendees may use the session how they like - at the level they like - and then continue it at home. Anyone with A Level Maths will find this session accessible, and those who have taught the FP1 module (so know about the complex conjugate z^*) will find all the techniques well within their grasp. How useful will this be in schools? Probably just a single lesson's investigation using Sketchpad at Stage 3/4, or an example of the use of Complex Numbers at A level, or a possibility for investigation for the Extended Project at A Level. Certainly no prior experience is necessary, but a love for all things circular would help! I hope to end with a discussion of convex mirrors - if anyone has one: bring it along!

9. Problem-Solving Strategies in the Magic Mathworks Travelling Circus. Paul Stephenson

On the website of The Magic Mathworks Travelling Circus, www.magicmathworks.org is the item 'Heuristics', a pdf which anyone is welcome to download. Over 20 years on the road we have found that visiting teachers most value our stations as opportunities for the students to practise problem-solving skills. Our double session at conference will be directed particularly (but not exclusively) at teachers new to teaching mathematics to the post-14 age group. We hope to use a number of the Magic Mathworks stations to show the variety of approaches which can be employed to deal with the mathematics thrown up by the activities.

10. Ask the Examiner: Decision (MEI). Sue de Pomerai

Come along and ask questions or make comments on the D1 and D2 exams. Sue has been a Decision Maths examiner for MEI for 12 years and will do her best to answer them!

11. Ask the Examiner: Applied (Edexcel). Greg Attwood

This will provide an opportunity to ask an Edexcel Chief Examiner about any of their applied units (Statistics and Mechanics)

Session K Saturday 1500 – 1600

1. An introduction to Group Theory. Sue de Pomerai

A group is an algebraic structure consisting of a set together with an operation that combines any two of its elements to form a third element, obvious isn't it? If you've ever wondered what Group Theory is all about (even if you're not teaching FP3) then come and learn a few basics about how it works and what it's useful for.

2. Ideas for teaching circular motion. Charlie Stripp/Stephen Lee

This session explores ways to teach circular motion, including the use of contexts and simple experiments to bring the topic to life!

3. Teaching t tests. Neil Sheldon

Do t tests represent the point at which your statistical confidence begins to wobble? Or is this an area you haven't dared venture into? Can you persuade students of the importance of degrees of freedom? Can you explain convincingly why using an estimated variance affects the level of significance? In this session we will aim to remove the mystery from t (and take a peek at some of the beautiful mathematics on which statistics rests).

4. A taster session in Decision Maths for Yr 11 students: Join the Dots! Sharon Tripconey

This is an introduction to some of the ideas in Graph theory and how they are used in real life. It is an activity that can be used with GCSE students. This session is suitable for teachers who have no experience of teaching Decision Maths.

5. GeoGebra in Further Mathematics. Bob Francis

This will be a hands-on session where delegates can learn how to use Geogebra to enliven their mathematics presentations, for both teaching and learning. You will learn valuable techniques for developing such resources. You will also be able to take away pre-prepared Geogebra files, ready for use in the Further Mathematics classroom.

6. NCETM Teacher Enquiry Funded projects. Fiona Allan

The NCETM Funded Projects Scheme is divided into four areas: Teacher Enquiry Funded Projects (TEFP), Mathematics Knowledge Networks (MKN), Further Mathematics Knowledge Networks (FMKN), and the Regional Projects Programme (RPP). The session will explain the differences between these and how to apply for funding. There will also be an opportunity to look at previous projects and their findings. The session is suitable for all teachers who are interested in undertaking action research focused on a particular area of their teaching.

7. What does progress look like in Realistic Mathematics Education compared with other approaches? Sue Hough

This session will look at Problem Solving data taken from Year 7 and Year 11 students who have worked with approaches based upon Realistic Mathematics Education. We will consider for example the responses of Foundation level students to questions such as $\frac{1}{4} + \frac{1}{2}$ and how their solution strategies can be used as a means of analysing progress. Suitable for: Teachers who wish to develop a problem solving approach within their classroom.

8. Preparing for STEP Mathematics 3. Peter Mitchell

This session is addressed at teachers who hope to prepare students for STEP Mathematics; it will focus on some of the mathematical issues raised in the questions, particularly from Maths 1 and 2, with a chance to try a question. The session is complementary to the corresponding one on Maths 1 & 2.

9. Problem-Solving Strategies in the Magic Mathworks Travelling Circus. Paul Stephenson

See J9.

10. Numerical Methods Coursework (MEI) Richard Lissaman

This session will explore approaches to the coursework component of the Numerical Methods (MEI) module. This piece of coursework is a great opportunity to increase students' levels of engagement with the module and to help them to really appreciate some of the important concepts in it. It can also show students how amazing and powerful some of the methods covered in the course really are. The sessions will address the key ideas that students should explore in their work as well as marking coursework.

11. Ask the Examiner: AEA (Edexcel). Greg Attwood

This will provide an opportunity to ask questions about the AEA in Mathematics. This is an inter-board qualification that is run by Edexcel and the speaker has been involved in the running and development of the qualification since its inception.



Whiteknights Lake, University of Reading campus, looking across to Foxhill House

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