MEI Newsletter **Issue 4 September 2006**

Mathematics in Education and Industry

New MEI staff

The start of this academic year is the time to welcome several newcomers to the MEI staff.

- Stella Dudzic, formerly of Skipton Girls' High School, is Programme Leader (Curriculum) and will be responsible for the various MEI syllabuses.
- Richard Browne, formerly of QCA, is Programme Leader (Industry), a new position to open up links between MEI and industry; Richard will also be a member of the Further Mathematics Network team.
- Stephen Lee is just completing a PhD on the knowledge of mechanics that students now entering engineering degrees have, as a result of changes to A Levels in the last decade. Stephen will be a member of the Further Mathematics Network team but will also extend our work with service mathematics courses for universities.
- Zara King and Holt Wong are Year in Industry students; much of their time will be spent on the on-line resources.
- Valerie Algar joins the office staff.

As ever, your telephone calls and e-mails are welcome. We are always pleased to hear your views and will do all we can to answer any questions you may have, or to help you in any other way.

Last summer's examinations

There were many complaints from Centres about one particular paper this summer. I would like to assure you that OCR has taken these comments very seriously. The immediate action happened at the award when the thresholds for that paper were set far below their design levels.

However, what is really important for the long term is to learn from the experience and so prevent similar problems arising on subsequent papers. The 2007 papers have already been set, revised and typeset. However, in the case of four units, OCR has decided to delay printing and instead to review the papers. Occasionally in the past the papers for one unit have been taken out of the pipeline and reviewed, but never anything on this scale.

Setting a paper is always a knife-edge exercise. You want to measure how much candidates know. If a paper is too easy, you end up discriminating on the grounds of careless mistakes rather than mathematical knowledge; if it is too hard, candidates' scripts fail to indicate what they can actually do. In this situation, it is perhaps inevitable that from time to time every specification has a paper that does not work well; a few years ago there were questions in the House of Commons about another board's Pure Mathematics 1.

Roger Porkess
Chief Executive

Self-describing numbers

E	F	H	I	N	O	R	S	T	U	V	W	X
$\frac{1}{6}$	$\frac{4}{3}$	$\frac{7}{6}$	$\frac{11}{6}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{5}{6}$	2	$\frac{2}{3}$	$\frac{3}{2}$	$\frac{5}{3}$	1	$\frac{13}{6}$

Using these values, you will find O+N+E=1 and T+W+O=2. How much further can you go?

There's more on this on the website.

Continuing Professional Development

CPD for A Level Mathematics teachers
This year MEI will deliver a series of 2-day CPD courses.

- An introduction to Mechanics;
- An introduction to Decision Mathematics;
- An introduction to Statistics;
- OCR Additional Mathematics;
- AS Further Pure Mathematics, FP1.

The three introductory courses in applied mathematics will cover the material that appears in the first module of that strand for any of the examination boards. For each course, the two days will be separated by a period of some months; participants will be encouraged to follow a programme of study between them and, for one year, will have access to web materials written specifically for the course. Details are on the enclosed flyer; please pass it on to any colleagues who wish to broaden their expertise in post-GCSE Mathematics.

Teaching Advanced Mathematics (TAM)
Congratulations to the Warwick and Manchester Metropolitan University cohorts for 2005-06 who are now submitting their portfolios and should receive their post graduate qualifications later this term. Last term over 70 teachers enrolled on the course at the four TAM universities (London South Bank and Chichester having recently joined the programme); as the newsletter goes to press they are in the process of teaching their first A Level or Additional Mathematics lessons.

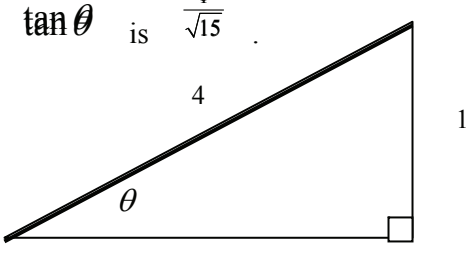
In addition to the programme of university days, further support is being provided through a programme of informal drop-in sessions at the universities. If you are interested in being involved in these in Manchester or London please get in touch. You may have noticed that this year's MEI conference included a 'TAM day'. This was an opportunity for teachers on the course to spend time working through the more demanding material from AS Core. It was very well received and will be repeated at next year's conference.

Teaching Further Mathematics (TFM)
This course is designed to support teachers of A Level Mathematics who wish to teach Further Mathematics at some point in the near future. The FP1 component is complete and the 29 participants are now working on Numerical Methods. Course assessment supports the teaching and learning of the module: in addition to completing a past paper, annotated with common misconceptions, participants are asked to explore how any one topic in the module gives different insights and alternative approaches to familiar mathematics from GCSE or Core Mathematics and then to investigate another aspect in more depth, taking the mathematics beyond the level one would expect from students. 29 different ideas should make for a fascinating read!
Further details about all these courses can be found on the MEI website
Bernard Murphy, Programme Leader (CPD)

Notes from the examinations
Many candidates are losing marks because they do not understand the meaning of the word *exact*. An example of this occurred in the Question 3 of the June C2 paper.

θ is an acute angle and $\sin\theta = \frac{1}{4}$. Find the exact value of $\tan\theta$.

Candidates were expected to draw a right-angled triangle, with hypotenuse 4 units and the side opposite the angle θ 1 unit, and then to use Pythagoras' theorem to show that the length of the third (adjacent) side is $\sqrt{15}$. So the exact value of $\tan\theta$ is $\frac{1}{\sqrt{15}}$.



Continued:

Many candidates, however, used their calculators to find arcsin(0.25) and then used them again to find tan of the answer. Candidates who did this commonly gave their answers as 0.258 or 0.2581988897, neither of which is the exact answer which was asked for in the question.

The Examiner's Report says " It must be made clear to candidates , as part of the preparation for this paper, that a request for ' the exact value' of anything usually implies that calculators must not be used." The same advice is given on page 32 of the Students' Handbook.

Diana Cowey
MEI observer at the award

Further Mathematics Network

The setting up of the Further Mathematics Network is completed this term, well ahead of schedule. There are 46 regional Further Mathematics Centres covering the whole of England. During academic year 2005/6 nearly 600 students received Further Mathematics tuition through the Network. Well over 200 revision days for AS/A level students and enrichment events for students at Key Stages 3/4 were held across England, and over 650 schools and colleges registered with their local Further Mathematics Centre.

The most well-established Centres are tutoring over 50 students, with the Coventry and Warwickshire Centre expected to be tutoring around 100 students this academic year. At the newest Centres the number of students being tutored is initially often in single figures, but experience suggests that most will expand rapidly.

The national figures for Further Mathematics entries this summer showed dramatic increases, far greater than any other AS/A level subject. Evidence suggests that this is largely thanks to the efforts of the Further Mathematics Network, not just through its tutoring of Further Mathematics students, but also through its raising the profile of Further Mathematics and encouraging and supporting more schools to offer it to a wider range of students. The figures are summarised in the table below. Wales and Northern Ireland are included as a control group because the Network does not currently operate there.

	A-level FM increase	AS-level FM increase	Proportion of A-level Maths taking A-level FM
England	**23.5% to 6950**	**25.1% to 6016**	**1 in 7**
Wales and NI combined	**4.6% to 320**	**12.7% to 276**	**1 in 14**

Please ensure your school/college is registered with the Further Mathematics Network. You can register with your local Further Mathematics Centre online via www.fmnetwork.org.uk. Registration means you receive free access to MEI's online Further Mathematics resources and are kept informed of revision days, enrichment events and the other activities of your local Centre.

There are two particular ways in which you may be able to help the Further Mathematics Network:

1. If you have expertise in teaching Further Mathematics, please contact your local Further Mathematics Centre manager, who may well be interested in the possibility of using you as a tutor.
2. Please let us know if you hear of universities either
    a. actively encouraging students to do Further Mathematics,
    b. apparently discouraging them; this particularly applies to a small proportion of medical schools (MEI has agreed a paper with the Council for Heads of Medical Schools, which may be downloaded from www.mei.org.uk).

Charlie Stripp, Further Mathematics Network Programme Leader
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Hello from the Programme Leader (Curriculum)

Perhaps by the time you read this, the shiny, brand-new excitement of the new academic year will be wearing off a bit and you may be involved in development planning, target setting and generally busy with a growing mountain of things to do. As I write this, I am still excited about my new role within MEI. The new job title will suggest to you that I am not quite the new embodiment of Michael Ling; I will be providing support for MEI specifications but Michael is continuing to be responsible for Two Tier GCSE, allowing me to concentrate on development of Double Award GCSE. It seems that constant change is here to stay in the world of education. How naïve of me to have dismissed teaching as a possible career when I was a teenager because it would be boring to do the same thing every year……

When I was a Head of Mathematics, I used to have a quotation on the wall, visible from my desk: "It is a curious fact about the human mind that people will work harder to do something which captures their imagination than they will for any practical purpose," mathematician Ian Richards. I found it helpful to remind me that whatever specific, measurable targets I set, what I was really aiming at was to capture the imagination of my students; doing this would result in achieving all the other targets. I can easily count the number of times I succeeded so I know it is easier said than done but I found it a more motivating aim than "n% A*-C". For some interesting ideas, focussed on post 16, to encourage active learning, have a look at "Improving Learning in Mathematics", produced by the DfES Standards Unit last year. If you can't find a copy in your school, an internet search will give details of how you can get a free copy.

All the best for this academic year; I know it will be busy, I hope it will also be successful and enjoyable. Please direct your questions about curriculum to me and feel free to get in touch if there is anything I could help you with.

Stella Dudzic
Programme Leader (Curriculum)
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Two-Tier GCSE

Teachers will be aware that the MEI GCSE has been adapted to fit the new requirements for two tiers.
The structure of the specification is exactly the same. It is modular with the modular paper contributing 30% to the assessment. The coursework contribution remains the same (for the time being anyway!) and the style and length of the papers are the same. The only difference is that there is no Intermediate Tier. The Higher Tier papers therefore contain material at grade D and the Foundation Tier papers contain material at Grade C.

The specification book and the specimen papers are available on the OCR web-site (www.ocr.org.uk - click on qualifications, then GCSE, then MEI Mathematics); the papers are adaptations of previous papers.
A set of practice papers is in the course of production and should be ready shortly after Christmas. Teachers are warned that the shading of statements in the specification refer to material that is in that tier but not the National Curriculum Programme of Study, this being a requirement of QCA. Teachers might find it more useful to know what is in the syllabus content for each Tier in this new specification that is not there in the current specification, and this resource is being prepared - please refer to the MEI web-site for advice as to when this resource will be ready. If any Centre would like to receive a presentation of this new specification then please contact the MEI Office.
Michael Ling

Module Summaries

The summary sheets for Numerical Computation are now published and available from the Office; £30 for the set of hard copies with permission to photocopy within the purchasing Centre. For a supplement of £6 they can also be provided on disk. For multiple purchase, only a single payment of £6 is required

Note:
Please see the MEI website: www.mei.org.uk for latest information on the on-line resources and useful telephone numbers and email addresses.
Tom Button