

**From the Chief Executive****QCA's AS and A Level Consultation**

QCA are currently carrying out an online consultation about the future of AS and A Levels in Mathematics and Further Mathematics and other level 3 mathematics qualifications. The issues involved are very serious and it is important that there is a good response from practising teachers. I do hope that everyone reading this will take part.

Along with this newsletter we are sending out a position statement about the proposals. The consultation looks rather a complicated affair, with many pages of documentation and no fewer than 5 questionnaires. So we are also including a second document designed to help you find your way round the various documents.

Our position paper and guidance have been written for everyone, not just those following the MEI syllabus, so do please share them as widely as possible. To help this, we have set up a page on our website where they, together with other relevant documents and web links, can be found and downloaded,

<http://www.mei.org.uk/qcaconsultation.shtml>

The closing date for this consultation is July 9<sup>th</sup> so it may be that some of you will have the opportunity to discuss it at local meetings such as MEI branches.

*Roger Porkess*

**QCA Consultation on changes to GCE Mathematics and Further Mathematics**

Models A and C of this consultation both have the potential to have a negative effect on the uptake of Further Mathematics. This is because the applied units cannot be used as part of either Mathematics or Further Mathematics qualifications so the timetabling of Further Mathematics will become much more difficult for schools and colleges. This will almost certainly result in a decrease in the number of students taking Further Mathematics.

The reasons are to do with finance and staffing.

- *Finance*

Currently Further Mathematics and Mathematics can be timetabled to give single A level Mathematics students a choice of units, whilst allowing Further Mathematics and Mathematics students to be taught alongside one another for their applied units. Many schools and colleges do this in one way or another, sometimes including year 13 students taking AS Further Mathematics by 'filling in' in year 12 classes. This reduces the need to run so many extra small, expensive classes in order to offer Further Mathematics, as well as having the advantage of offering choice to the single A level Mathematics students. Without this flexibility, many small schools and colleges would not be able to teach Further Mathematics at all, and larger ones could only offer it to fewer students.

- *Staffing*

The need for schools and colleges to provide more small Further Mathematics classes would require them to commit a significant part of the teaching time of some of their most expert staff to a very small number of students. Many institutions will, quite rightly, be unwilling to deploy their staff in this way.

When responding to the QCA questionnaire, please make sure you weigh up the possible implications for Further Mathematics!

*Charlie Stripp*

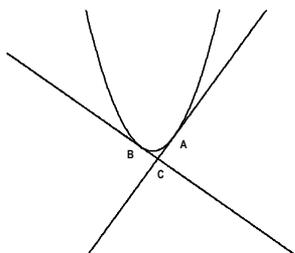
Programme Leader (The Further Mathematics Network)

**MEI conference 29 June to 1 July 2009**

The conference is an ideal opportunity to get teaching ideas, catch up on developments in mathematics education, do some interesting mathematics and generally be equipped and enthused for next academic year. Sessions this year include ideas for teaching particular topics at A Level and also how to stretch students. Details are on

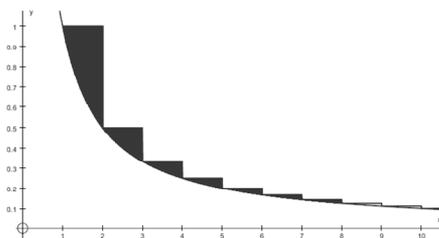
<http://www.mei.org.uk/> Email Stella Dudzic or Bernard Murphy if you have any questions about the conference.

The diagram shows a quadratic curve with two of its tangents at points A and B. These tangents are perpendicular and meet at C.



Find the coordinates of A, B and C for a quadratic of your choice.

How good is  $\ln N$  as an estimate of  $\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{N}$ ?



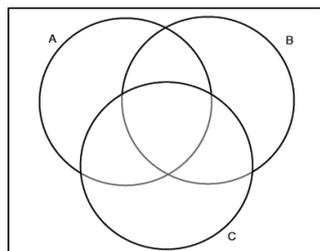
A piece of wire, 100 cm. in length, is bent into the shape of a sector of a circle.



Find the maximum value that the area of the sector can have.

Find one circle for each region of the Venn diagram.

- A: The centre is on the line  $y = 2x$
- B: The circle touches the  $x$ -axis
- C: The radius is 5



Tell me a property that the coefficients  $a$  and  $b$  must have for the line  $y = ax$  to be a tangent to the curve  $y = x^2 + bx + 4$ .

Describe which features of  $y = x^2 + 6x + 12$  make it an example of a quadratic curve that does not cross the  $x$ -axis.

What is the same and what is different about  $(x - 2)^2$  and  $(2 - x)^2$ ?

Give me an example of a curve for which

$$\int_{-2}^0 y \, dx = -\int_0^2 y \, dx$$

... now give me another.

These are the kinds of problems and questions teachers on the TAM course grapple with on course days and use in their teaching.

If you or a colleague would like to know more about the TAM course, please see <http://www.mei.org.uk/tam.shtml>

### The uses of mathematics in the engineering workplace.

MEI and the IET (Institution of Engineering and Technology) will hold a second joint conference on 1 June 2009, with the title *The uses of mathematics in the engineering workplace*. We are keen to attract more practising maths teachers to attend, to help develop exemplars of mathematics being used in the engineering workplace, in a form that is suitable for teachers to use with their students. Engineers will be present to provide detailed descriptions of ways they use mathematics in their work. Please contact [richard.browne@mei.org.uk](mailto:richard.browne@mei.org.uk) for more information.

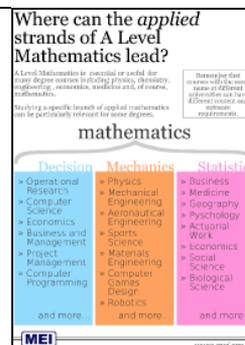
Richard Browne  
Programme Leader (Industry)

### Where can the different strands of applied mathematics lead?

There is a poster you can download and print out at <http://www.mei.org.uk/meiresources/>

You might find this useful to have up in the classroom.

Stella Dudzic  
Programme Leader (Curriculum)



### **TFM update**

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

We are currently taking applications for TFM 2009. Information and application forms can be found at [http://www.fmnetwork.org.uk/teacher\\_area/tfm.php](http://www.fmnetwork.org.uk/teacher_area/tfm.php)

### **Live online Professional Development**

The LOPD programme is an exciting modern approach to professional development, offering teachers an opportunity to study complete modules or topics from A level and Further Mathematics.

A small group of teachers meet weekly for online sessions with a tutor using **Elluminate**, a well established web-based package which is easy to use and has features that make it ideal for live mathematics tutoring. Elluminate allows a tutor and delegates to communicate live online using audio, handwriting on a shared virtual whiteboard and instant messaging via the internet.

Participants say:

*“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 as professional development should be.”*

For more information go to [http://www.fmnetwork.org.uk/teacher\\_area/rpd.php](http://www.fmnetwork.org.uk/teacher_area/rpd.php)

Sue de Pomerai ([sue.depomerai@mei.org.uk](mailto:sue.depomerai@mei.org.uk))

### **The future of the Further Mathematics Network**

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 FMN has rescued Further Mathematics from what looked like a terminal decline. Since the FMN started in 2005, entries to AS Further Mathematics have risen by 125% and entries to the full A level by 59%. When the FMN started, Further Mathematics was largely unavailable to students in the state sector. Through the work of the FMN its fortunes have been transformed to make it one of the fastest growing subjects, increasingly valued by universities and employers.

From August, the FMN 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 within the Diplomas.

Currently MEI has preferred supplier status for the new contract to run the FMSP. We will use the period between now and September to make the transition from the FMN to the FMSP. Please see the FMN website for updates over the summer term.

*Charlie Stripp*

## UMS marks

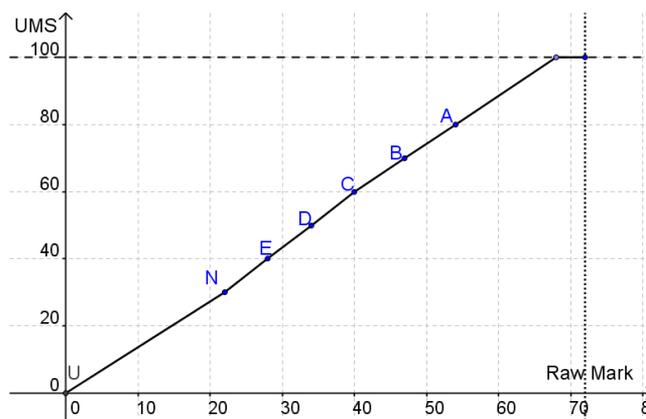
To be eligible for an A\* grade in A Level Mathematics, candidates need a grade A overall and a total of at least 180 UMS marks in C3 and C4. For A Level Further Mathematics, they need a grade A overall and a total of at least 270 UMS marks on the three best A2 units. First awards of A\* grades at A Level will take place in summer 2010 (see [http://www.naa.org.uk/libraryAssets/media/Changes\\_to\\_A\\_levelsFINAL.pdf](http://www.naa.org.uk/libraryAssets/media/Changes_to_A_levelsFINAL.pdf)). The advent of A\* at A Level might result in students (and teachers) asking questions about how UMS marks are calculated from raw marks. A brief explanation follows, based on the MEI A Level system which has 72 raw marks available on examination papers.

In a modular system, candidates are likely to take modules at different times. It is impossible to ensure an absolutely consistent standard when setting examination papers. The design threshold for grade A is 80% of raw marks, which is 57.6 raw marks on a unit. In practice, there will be some variation. For example, borderline grade A candidates on a particular unit might get 60 marks on a January paper but 56 on a June paper. To ensure that these candidates are treated in the same way when units are aggregated, a borderline grade A always counts for 80 UMS marks.

For AS and A Level units, examiners decide the minimum raw mark needed for grade E and for grade A. The interval between these two raw marks is divided as evenly as possible to give the grade boundaries. For example, consider a unit which had a threshold of 54 for grade A and 28 for grade E. From A to E there are 4 intervals between grades so the difference between these thresholds (26) is divided by 4 giving 6 remainder 2. Two intervals will be 7 raw marks and two will be 6. If the intervals cannot be equal then the larger intervals are given to the higher grades; this is to the advantage of most candidates. These threshold marks are converted into the appropriate UMS marks.

Mark	A	B	C	D	E	U
Raw	54	47	40	34	28	0
UMS	80	70	60	50	40	0

When the raw mark is plotted against the UMS mark the points for grade thresholds A to E will lie (nearly) in a straight line. This line is continued to 30 UMS, a notional grade N. A raw mark of zero corresponds to zero UMS. Line segments between these points will determine the number of uniform marks corresponding to any raw mark. The number of UMS marks must be a whole number so rounding is used where necessary.



There is sometimes confusion about what happens above grade A; this is particularly topical in view of the introduction of A\* at A

Level. On this particular unit, if the line segment from B to A is continued it hits the maximum UMS mark of 100 at a raw mark of 68. In this case, full UMS (100) could be achieved with 68 (or more) raw marks. This can be calculated as follows. The interval from B to A is 7 raw marks, which corresponds to 10 UMS marks, so it needs 14 raw marks above 54 to achieve the further 20 UMS marks needed for full marks. In this example, it is possible to get full UMS marks without getting the whole paper right.

If the extended line segment from B to A cuts the 100 UMS line at over 72 raw marks, the above procedure would make 100 UMS impossible. To overcome this, a line from the grade A point is joined to (72, 100) instead.

The rules for converting raw marks to UMS marks for GCSE are similar to these but there are more decisions to be made about grade boundaries. The rules dealing with this can be found in the code of practice covering GCSE, GCE and AEA: <http://www.ofqual.gov.uk/files/2009-04-14-code-of-practice.pdf>. AQA have produced a leaflet about UMS: [http://www.aqa.org.uk/over/stat\\_ums.php](http://www.aqa.org.uk/over/stat_ums.php).

Stella Dudzic