United Kingdom Mathematics Trust

Maths Challenges News

Issue 40 September 2012

In this issue

Diary dates for 2012/13	2
Volunteer for UKMT	
Fundraising	
IMO 2012 - The Best in Europe	3
Mentoring Schemes	
Poster competition	
New Publication - A Prime Puzzle	4
Prize Sudoku	

UKMT Maths Challenges

Challenge your pupils and test their problem solving skills by entering your students in the 2012/13 UKMT Maths Challenges. The questions are accessible but are designed to stretch pupils beyond the school curriculum and make them think.

The Challenges are straightforward to administer in schools, and the papers are sent back to UKMT for marking. Feedback is quick, as results are now emailed (and posted) and you will receive detailed analysis of your school's performance and how it compares to the nation. Extended solutions, including new extension material, are available to download from the UKMT website after the event.

Students are recognised for their performance, with every school not only receiving a certificate to present to their best performer overall, but also certificates are now awarded to the best student in each year group. The top 40% of students nationwide receive a gold, silver or bronze certificate (the top 60% for the Senior Challenge). High scoring pupils are invited to participate in follow-on competitions. These awards provide an excellent opportunity to highlight mathematics within your school and celebrate your students' mathematical success in the local press.

JMC certificate winners from Furze Platt Senior School, Berks

Can you and your pupils do these questions from the 2011/12 Challenges?

Senior Maths Challenge	Intermediate Maths Challenge	Junior Maths Challenge
A triangle has two edges of length 5. What length should be chosen for the third side of the triangle so as to maximise the area within the triangle? A 5 B 6 C $5\sqrt{2}$ D 8 E $5\sqrt{3}$	Alex Erlich and Paneth Farcas shared an opening rally of 2 hours and 12 minutes during their table tennis match at the 1936 World Games. Each player hit around 45 shots per minute. Which of the following is closest to the total number of shots played in the rally? A 200 B 2000 C 8000 D 12 000 E 20 000	Tommy Thomas's tankard holds 480ml when it is one quarter empty. How much does it hold when it is one quarter full? A 120 ml B 160 ml C 240 ml D 960 ml E 1440 ml

Entering the Challenges is easy. Complete the entry form sent to schools (or download from our website) and return to us with an official school purchase order or cheque payment. Full details about the Challenges, including sample papers, can be found on our website at www.ukmt.org.uk.

UKMT Contact Details

UK Mathematics Trust - a registered charity in England & Wales.
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Diary Dates for 2012/13

Maths Challenges and Follow-on Rounds

Challenge	*Date*	*Follow-on Round*	*Date*
Senior	**Tuesday 6 November 2012**	**BMO1 and Senior Kangaroo** **BMO2**	**Friday 30 November 2012** **Thursday 31 January 2013**
Intermediate	**Thursday 7 February 2013**	**IMOK Olympiad** **IMOK Kangaroo**	**Thursday 14 March 2013** **Thursday 21 March 2013**
Junior	**Thursday 25 April 2013**	**JMO**	**Tuesday 11 June 2013**

What is it like to volunteer for UKMT?

I have been a volunteer for the Team Maths Challenge ever since 2006, having first entered my school for the competition the previous year. I enjoyed the venture so much from a teacher's perspective that I wanted to offer any suitable skills that I had to the UKMT organisation and become part of what was then a young and burgeoning competition. I had fond memories of the multiple-choice Maths Challenge papers from my own school days and was very keen to see Mathematics widening its reach to youngsters via this showpiece event.

After registering my interest, I was invited to the Team Maths Challenge development weekend, where I met many of the other volunteers and got a feel for what goes into the organisation of such a large national competition. Initially I was invited to be an assistant coordinator at a regional final close to me, where I watched and 'learnt the ropes'. The following year I ran a regional final as the lead coordinator and was impressed by how much assistance and support there was from the UKMT central office. The materials sent out for the regional finals are so carefully organised that there is very little room for anything to go wrong (touch wood!). I have also hosted a regional final at my school on a couple of occasions.

Three years ago I started question-writing for the Mini Relay round and this is something I still enjoy doing; it is nice to think that pupils from over a thousand schools will be tackling your fiendish problems. Questions all get trialled and tested out by the volunteers twice a year, often with the same gusto and enthusiasm as the pupils themselves!

The UKMT flourishes due to the kind help of its many volunteers, and I am always made to feel that my contributions, however small, are valued. I am so pleased to have got involved back in 2006 and would encourage anyone who shares an interest in the Team Maths Challenge, or any other UKMT activity, to join in!

By Karl Hayward-Bradley, Warwick School.

To find out more about UKMT volunteering opportunities, please contact us on enquiry@ukmt.org.uk.

Congratulations to Orley Farm School who won the 2012 Team Maths Challenge National Final! Look out for entry details for the 2013 TMC which will be available on our website from October.

The Senior Team Maths Challenge Regional Finals will be taking place shortly, with events running around the UK during November. Further details can be found at www.furthermaths.org.uk/stmchallenge.php.

UKMT Fundraising

As a registered charity, the UK Mathematics Trust relies on a balance of financial resources coming from fees from its mathematics competitions and support of individuals, trusts and companies to help achieve our aims. To facilitate one-off and monthly donations we have launched a UKMT site at virginmoneygiving.com, and we are now registered for gift aid. Regular donors will receive a lapel pin to show their support and can opt in to receive additional news from us via email. See the UKMT's page at http://tiny.cc/js00iw.

The Best in Western Europe!

In July every year, the most gifted young mathematicians from around the world come together for the International Mathematical Olympiad (IMO). This year the 53rd IMO took place in Argentina and a team of six went there to represent the UK.

The team, James Aaronson, Sam Cappleman-Lynes, Andrew Carlotti, Daniel Hu, Joshua Lam and Matei Mandache along with their leaders James Cranch, Jack Shotton and Bev Detoeuf, went over to Buenos Aires a week before the start of the official IMO to take part in an annual training camp with the Australian team. The final session of this camp is a competition between the two teams, "The Mathematical Ashes", and once again the UK team brought the trophy home.

After five days of hard training, the team travelled down to Mar del Plata for the IMO. One hundred teams from around the world descended on the seaside town for the competition, which consists of two papers, each four and a half hours long with three questions of varying difficulty.

IMO Day 1, Problem 1.
Given triangle ABC the point J is the centre of the excircle opposite the vertex A. This excircle is tangent to the side BC at M, and to the lines AB and AC at K and L, respectively. The lines LM and BJ meet at F, and the lines KM and CJ meet at G. Let S be the point of intersection of the lines AF and BC, and let T be the point of intersection of the lines AG and BC.
Prove that M is the midpoint of ST.
(The excircle of ABC opposite the vertex A is the circle that is tangent to the line segment BC, to the ray AB beyond B, and to the ray AC beyond C.)

Whilst the judges and leaders spent four days deliberating, discussing and debating the completed scripts, the teams passed the time with other less stressful pursuits. This year these included a trip to the aquarium, ice skating and various other challenges such as learning circus skills and trying to complete a 23000 piece jigsaw, and of course because it was Argentina – tango lessons!

The week culminated with the closing ceremony where medals were presented to the high scorers. The UK team received one gold, one silver and four bronze medals, coming joint top out of all participating teams from Western Europe. A great achievement by the team, following lots of hard work and effort.

The search for next year's team (to go to Columbia) starts again in the autumn, with the Senior Maths Challenge on Tuesday 6 November. Further details about the IMO, including all the questions, can be found at www.bmoc.maths.org.

UKMT Mentoring Schemes - apply now!

All mentoring schemes (Junior, Intermediate and Senior) will start again at the beginning of October. If you have any exceptional young mathematicians who you think would benefit from an external mentor, either at Intermediate (ages 13-16) or Senior (ages 16-18) level, email mentoring@ukmt.org.uk for more information. If you were on the distribution list last year, you will automatically receive the new material this year.

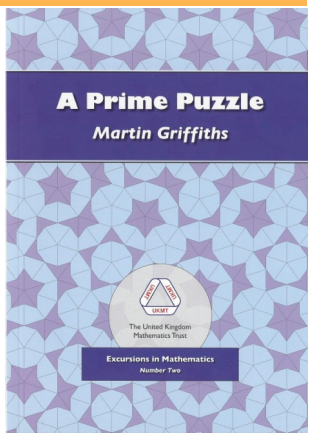
All the mentoring schemes are free and run from October to May. Before applying, please check our website for general information on the schemes and sample materials, at www.mentoring.ukmt.org.uk.

Poster Competition Result

Congratulations to Becky Wilson from Parkstone Grammar School for her winning poster! A poster produced by Arbelos based on Becky's entry is on its way to all schools with this mailing. Becky will receive a book token and her school will receive a free copy of *Ten Years of Maths Challenges*.

Look out for details of our annual poster competition which will feature in the next Newsletter.

A Prime Puzzle



Out now! Our newest publication *A Prime Puzzle* by Martin Griffiths.

Martin says about the book "some mathematical results are very simple to state but extremely difficult to prove. Dirichlet's theorem on primes in arithmetic progressions is just such a result. The primary aim of this book is to present a proof of this truly magnificent theorem that can be understood by any determined and able person possessing post-16 mathematical knowledge. Indeed, the intended readership encompasses sixth-form students, undergraduates, teachers, lecturers or in fact anyone with a genuine interest in mathematics and a fascination for numbers in particular.

The proof of Dirichlet's theorem incorporates a wealth of beautiful mathematical ideas, and allows us to establish and to utilise some fascinating links between number theory, analysis, group theory, complex numbers, series and various arithmetic functions. In short, it leads to mathematics that is demanding yet accessible, aesthetically pleasing and wonderfully interconnected. It's a great way to learn about more advanced aspects of our subject."

A Prime Puzzle can be ordered from our website at www.publications.ukmt.org.uk.

Prize Sudoku

In Sudoku, every digit from 1 to 9 must appear in each of the nine rows, each of the nine columns, and each of the nine outlined boxes.

Medium – warm up on this one!

7			6	8		3		
		8	2		7			
			5				8	2
	3					9		4
1			8		4			7
9		4					6	
3	1				8			
			1		3	5		
		9		7	5			

PRIZE puzzle - a little harder! →

			2				7	1
		9		5			6	
					6	8	9	5
2				3	8		4	
	9						3	
	4		6	2				7
9	8	7	5					
	6			4		7		
4	5				2			

Send completed PRIZE puzzles (photocopies acceptable—these puzzles are also suitable for pupils) to:
Sudoku40, UKMT, School of Mathematics Satellite, University of Leeds, LS2 9JT
A draw from correct entries will take place after the closing date, 31 October 2012, for 2 x £10 book tokens.

NAME……

SCHOOL ADDRESS ……

……SCHOOL POSTCODE……