United Kingdom Mathematics Trust

Maths Challenges News

Issue 43   September 2013

Top EU Nation at IMO

The UK finished ninth out of 97 participating countries in this year's International Mathematical Olympiad (IMO), the highest finish since 1996, and top EU nation. Andrew Carlotti (pictured below) won gold to add to his IMO medal collection of two gold and one bronze, making him the highest achieving UK competitor of all time. All other members of the UK team won medals at the world's most prestigious mathematics competition.

Our congratulations to the six students representing the UK:

Andrew Carlotti (Sir Roger Manwood's School, Kent), gold medal.
Gabriel Gendler (Queen Elizabeth's School, Barnet), silver medal.
Daniel Hu (City of London School), silver medal.
Sahl Khan (St Paul's School, London), bronze medal.
Warren Li (Fulford School, York), silver medal.
Matei Mandache (Loughborough Grammar School), gold medal.

The team was accompanied by the Team Leader, Dr Geoff Smith (University of Bath) and the Deputy Team Leader, Dominic Yeo (Worcester College, Oxford).

The 54th IMO took place from 18 – 28 July in Santa Marta, Colombia

---

IMO Day 2, Problem 4
Let ABC be an acute-angled triangle with orthocentre H, and let W be a point on the side BC, lying strictly between B and C. The points M and N are the feet of the altitudes from B and C, respectively. Denote by ω_1 the circumcircle of BWN, and let X be the point on ω_1 such that WX is a diameter of ω_1. Analogously, denote by ω_2 the circumcircle of CWM, and let Y be the point on ω_2 such that WY is a diameter of ω_2. Prove that X, Y and H are collinear.

SMC Deadline Approaching!

Have you entered the Senior Maths Challenge? It's a great way to test your students' problem solving skills! The closing date is 21 October – why not enter today?

The top 60% of students nationwide receive certificates, and high scoring students are invited to participate in follow-on competitions which could lead to representing the UK in mathematics competitions at international level!

Keep your eye out for the SMC entry forms arriving through the post in September, or download an entry form for the SMC and all our other competitions from www.ukmt.org.uk.

UKMT Contact Details

UK Mathematics Trust - a registered charity in England & Wales.
UKMT, School of Mathematics, University of Leeds, LS2 9JT
Tel: 0113 343 2339   Fax: 0113 343 5500   Twitter: @UKMathsTrust
Email: enquiry@ukmt.org.uk   Website: www.ukmt.org.uk

Diary Dates for 2013-14

Maths Challenges and Follow-on Rounds 2013-14

Challenge	Date	Follow-on Round	Date
Senior	Thursday 7 November 2013	BMO1 and Senior Kangaroo BMO2	Friday 29 November 2013 Thursday 30 January 2014
Intermediate	Thursday 6 February 2014	IMOK (Olympiad and Kangaroo)	Thursday 20 March 2014
Junior	Thursday 1 May 2014	JMO	Thursday 12 June 2014

Hosting a UKMT Mathematical Circle

In July, we hosted 37 students from 19 schools for our first ever UKMT Mathematical Circle. Over the two days, they were offered a wide variety of sessions, with some limbering-up problems to get started when they arrived. Each day began with a talk by a long-standing UKMT contributor, Dr Peter Neumann of Oxford University, who led us through an exploration of problems with "words", ultimately arriving at a description of the hundred-year-old Burnside Problem, a major outstanding question in algebra. We were also excited to hear about some as-yet unpublished major progress towards a solution.

Another major theme of the two days was geometry, and we had a two sessions on triangles, constructing the four major triangle centres (circumcentres, incentres, centroids and orthocentres) and learning proofs that these actually exist. These sessions had been designed by Dr Andrew Jobbings for the Mathematical Circles, complete with a series of very clear slides. They finished with an introduction to the amazing Euler line and nine-point centre.

The other sessions were all independent of each other. The first was on the ubiquitous topic of permutations and combinations, with the aim of getting to grips with the ideas and learning how the famous formula for "n choose r" actually works. Another offered an introduction to polar coordinates, with the students exploring a whole range of pretty curves using Autograph, while Tuesday ended with us watching spots on the tyre of a moving bicycle and working out how to draw the resulting cycloids on computer.

Finally, the Monday afternoon finished with an exploration of polyhedra using polygonal mats from the ATM (Association of Teachers of Mathematics). The participants (and sixth-form helpers) had much fun constructing all of the regular and several semi-regular (Archimedean) polyhedra out of the mats and glue, and gained a much deeper insight into the nature of solids in the process.

A great time was had by all, and several new friendships were forged. I would happily encourage others to run a similar event!

Dr J Gilbey, Maths Teacher, Watford Grammar School for Girls.

Thanks to funding from the DfE, we will be running over 20 Maths Circles in the next two years. If you would like to find out more about how you can become involved in the Mathematical Circles, either through your school hosting an event or by supporting us in running a session, please do contact us at enquiry@ukmt.org.uk.

Department for Education

A tale of two Alans!

In July, we were very pleased to welcome Dr Alan Eames-Jones (pictured, to the right) as the new UKMT Secretary. Alan is a recently retired maths teacher who is looking forward to his new key role as Secretary of the Trust.

We take this opportunity to say a huge thank you to Dr Alan Slomson (pictured, to the left), the outgoing Secretary, for his many years of service to the Trust, and we are pleased that the Trust will continue to benefit from his involvement in other areas of our work.

UKMT Team Maths Challenges

We were delighted to see a record number of entries for the Team Maths Challenge (TMC) in 2013, with a geographical spread of participating schools ranging from as far north as the Shetland Islands right down to Penzance. Next year we will be extending our reach further, with a new Regional Final venue in North Wales, and we look forward to welcoming more new schools to the competition.

Congratulations to City of London School, who lifted the Team Maths Challenge trophy at the 2013 National Final, and The Perse School in Cambridge for winning the Poster Competition.

The 2014 TMC will be launched in early October, when entry details and regional final dates will be available from our website. In the meantime you can download materials from previous years' competitions (including those from 2013) from http://www.tmc.ukmt.org.uk/.

Last year's Senior Team Maths Challenge (STMC) also attracted more schools than ever before and this year's Regional Finals will be taking place shortly, with events happening across the UK during November. An entry form is enclosed with this newsletter and further details including venues and dates can be found at http://www.furthermaths.org.uk/stmchallenge.php.

Team Maths Challenge — Relay Round 2013	*Senior Team Maths Challenge — Group Round 2010*
A nurse needs to give the correct amount of medicine to a patient who is going away for a fourteen-day holiday. One dose is 10 ml and the patient needs the medicine three times a day. How much medicine will be required altogether?	In the highest scoring match of the World Cup, Hongeria beat Alduras 19 goals to 9. If Alduras were never in the lead, how many possible scores could there have been at half time?

European Kangaroo Celebration

The Festival to celebrate 20 years of Russian Kangaroo contests was held from the 15th to the 18th of May in St Petersburg, Russia. The All-Russia Kangaroo Committee invited neighbouring countries, and countries involved in the early days of these international competitions, to send two representatives to the Festival. Andrew Jobbings and Stephen Power were chosen to represent the UK and joined delegates from Belarus, France, Germany, Kazakhstan, Moldova, Poland, Slovenia and Ukraine. Also attending the Festival were representatives from over 50 regions from across Russia and around 70 high-performing Russian students and their families.

At the Festival Opening Ceremony, Andrew received, on behalf of UKMT, a splendid bronze statue of a kangaroo to mark the occasion!

Over the course of the Festival, educational and mathematical thoughts were exchanged as well as ideas for future problems and details of how different countries run their particular versions of the contests. In addition, there were a variety of cultural activities arranged for the international representatives including a night at the ballet and a visit to the Hermitage – a museum with over a thousand rooms containing priceless treasures. An unforgettable experience for all those involved.

BCME-8 Bursaries Available

The four-yearly British Congress of Mathematics Education (BCME) takes place in Nottingham from April 14th - 17th 2014. BCME is the largest mathematics or mathematics education conference in the UK, attracting delegates from all sectors. It brings together teachers from early years to higher education, researchers, teacher educators, CPD providers, advisers, consultants, policy makers, examiners and professional and academic mathematicians.

The UKMT is offering bursaries to help support those who wish to attend. To apply for a bursary, please write to the Director of the Trust, Rachel Greenhalgh (either via enquiry@ukmt.org.uk or to the address on the front cover), before 6 January 2014, detailing why you wish to attend. We will contact successful applicants before the end of January 2014.

More information about BCME can be found on their website at www.bcme8.org.
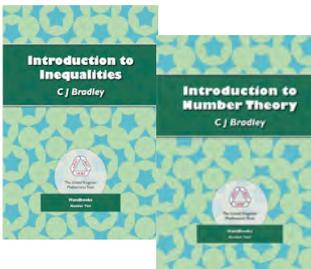
Christopher Bradley RIP

We were extremely sorry to hear that Christopher Bradley passed away unexpectedly on Thursday 11 July 2013.

Christopher will be sadly missed and fondly remembered by many people involved in the UK Mathematics Trust, particularly those at BMO and international competition level. Christopher's contribution to the British Mathematical Olympiad scene was immense. He was appointed to the UK Mathematical Olympiad Committee and became Deputy Leader for the International Mathematical Olympiad (IMO) in Moscow 1991, Istanbul 1993, and Toronto 1995.
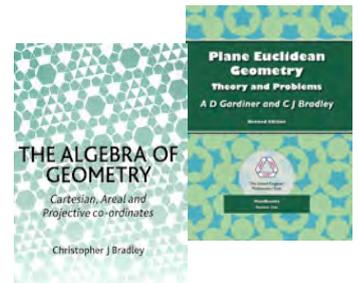
During the 1990s and early 2000s, he was heavily involved in the training and development of these young people with exceptional mathematical abilities, and many people involved in UKMT activities can remember hearing him give some wonderful sessions at Trinity Training Camp and at the Summer School. His creativity and love of geometry also led him to create a large number of mathematical problems to support the British Mathematical Olympiad and international community.

Throughout his later life, Christopher continued his involvement in Olympiad matters through tutoring locally, despite deteriorating health. During his retirement, he was prolific in geometry research, and his writings can be found here http://people.bath.ac.uk/masgcs/bradley.html.

More recently, the UKMT published a number of Christopher's books which continue to be appreciated by all who read them: "Plane Euclidean Geometry Theory and Problems" with Tony Gardiner; "Introduction to Number Theory"; "Introduction to Inequalities"; and "The Algebra of Geometry".

Our thoughts at this sad time are with his family, and we thank them for their donation to UKMT in his memory.

Poster Competition Winner!

Congratulations to Anushka Menon from Wellington International School Dubai for her colourful and eye-catching winning poster. Her design has been recreated by Arbelos and the stunning poster is included with this mailing.

The judges were impressed with the standard of entries this year, and a special mention must go to Alex Palewicz from St Edwards School Cheltenham, and Megan Hocking and Hannah Martin from Parkstone Grammar School, who were close runners up! Thank you to all who participated and look out for another poster competition later in the academic year.

Prize Sudoku

Medium – warm up on this one!

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

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.

A draw from the correct entries will take place after the closing date and the winner will receive a book with a mathematical theme.

PRIZE puzzle - a little harder!
↓

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

Please send entries (photocopies accepted) by the closing date of Friday 25 October 2013 to:
Sudoku, UKMT, School of Maths Satellite, University of Leeds, Leeds LS2 9JT.

Don't forget to include your name, school name, and full school address!

Winner of Sudoku 42:
Katie Johnson of City of Derby Academy