# UK Mathematics Trust News

**United Kingdom Mathematics Trust**

## In this issue

## Mathematical Challenges

Do you have a particular favourite Mathematical Challenge question? Is there a question that you remember from previous papers and one that you still use today?

We asked our volunteer problem setters about their favourite questions from years gone by.

Karen Fogden, Chair of the Senior Problems Group, said

"My favourite SMC question from recent years is 2013 question 11.

I remember the 'Wow moment' the first time I tried this question and I really hope that lots of students had that same feeling when they considered the problem during the 2013 paper.

What a beautiful problem; it's elegant, concisely stated and such a simple result. I felt like I should have known it before!"

### SMC 2013 Question 11

11. The diagram shows a circle with centre $O$ and a triangle $OPQ$. Side $PQ$ is a tangent to the circle. The area of the circle is equal to the area of the triangle. What is the ratio of the length of $PQ$ to the circumference of the circle?

A $1:1$    B $2:3$    C $2:\pi$    D $3:2$    E $\pi:2$
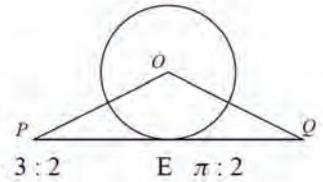
### IMC 2001 Question 24

24. A 4 by 4 'antimagic square' is an arrangement of the numbers 1 to 16 inclusive in a square, so that the totals of each of the four rows and four columns and two main diagonals are ten consecutive numbers in some order. The diagram shows an incomplete antimagic square. When it is completed, what number will replace the asterisk?

A 1    B 2    C 8    D 15    E 16

| 4 | 5 | 7 | 14 |
|---|---|---|---|
| 6 | 13 | 3 | * |
| 11 | 12 | 9 | |
| 10 | | | |

Howard Groves, Chair of the IMC and JMC problem setting group, said

"I have a lot of favourite Challenge problems, but I have selected one - question 24 of the 2001 IMC.

We often see problems based on magic squares, but the idea of an 'antimagic square' is really original. The square contains the first sixteen positive integers and the totals of all four rows, all four columns and the two main diagonals are not only all different, but they are ten consecutive positive integers. It is a very clever problem and one which is very accessible - no special knowledge is needed."

Entries for the 2018-19 Mathematical Challenges are now being taken.

Look out for the information about the launch of our new website towards the end of this year to enable you to enter online, view Challenge results, and much more! In the meantime, entry forms will shortly be arriving in school or download from our current website.

Download past questions from **www.ukmt.org.uk**

# Volunteer Honours!

We were thrilled to see our volunteers past and present recognised in the 2018 New Year Honours list.

Howard Groves was awarded an MBE for services to education, and his citation referenced his work on the UKMT problems groups and being a member of the Mathematical Challenges strategic committee.

You may not realise it, but you are likely to have come across some of Howard's work. As chair of the Junior and Intermediate problem setting committee since 1998, Howard has been involved in and overseen the work of these groups to produce the Junior and Intermediate Mathematical Challenge papers and solutions each year.

Over the years, he's also been involved in setting problems for other areas of our work including as chair of the Senior Mathematics Challenge for ten years, presenting to teachers at events, leading sessions for students at the National Mathematics Summer Schools, and representing the UKMT at national and international conferences, amongst other things, all in a voluntary capacity!

Whilst we find our own way to recognise our volunteers, we think that the public recognition of the work Howard has done for the Trust is well deserved.

The Queen presented Howard's MBE on a sunny day in early May, and commented, "maths is a very difficult subject".

Many congratulations, too, to former UKMT Chair, Professor Bernard Silverman, who was awarded a Knighthood for public service and services to science.


Howard Groves with his MBE

UKMT Trustees also presented Bill Richardson with the UKMT Award for Outstanding Volunteer Contribution earlier this year.


Bill Richardson with his award

This is the highest accolade awarded by UKMT to our volunteers, and is presented to people who have made a significant input to our work over time, and are stepping back from volunteering commitments.

We are extremely grateful to all our volunteers for their help and support in organising and running our activities.

Would you like to find out more? See how to apply to volunteer at **www.ukmt.org.uk/about-us/getting-involved/**

# Senior Team Maths Challenge

Look out for the launch of the 2018-19 Senior Team Maths Challenge (STMC), with further details and a copy of the winning STMC National Final poster arriving in schools and colleges shortly. Regional events will be taking place at over 60 venues across the UK in the autumn.

Find out more about this competition, which is run in partnership with the Advanced Mathematics Support Programme (AMSP, previously known as the Further Mathematics Support Programme) and download past material to try out in the classroom from our website at **www.ukmt.org.uk/team-challenges/senior-team-challenge/**.


*The winning poster from the STMC National Final 2018.*

## EGMO Success!

Our congratulations go to the team of students representing the UK at this year's European Girls' Mathematical Olympiad, in Florence, Italy.

The UK team, which is sponsored by Man AHL, achieved its highest ever score in an EGMO competition, being placed 3rd out of 52 participating teams.

The team's best performer, 17 year-old Emily Beatty, also became the first ever UK candidate to achieve a perfect score of 42 out of 42 in the competition, ranking joint 1st among the 192 competitors and winning a Gold Medal.

Joining Emily in the UK team were Alevtina Studenikina and Naomi Wei, who each achieved a Silver Medal for their scores, as well as Melissa Quail, who took home a Bronze Medal.

## Mathematical Olympiad for Girls

Entries are now being accepted for the UK Mathematical Olympiad for Girls (MOG) which is taking place on Tuesday 2 October. Through MOG, we hope to encourage and inspire more talented female mathematicians to get involved in advanced problem solving.

Please note that these papers are much harder than the standard Challenges. Some students can be discouraged from taking part in subsequent activities if they have a negative experience through sitting an Olympiad paper when they are not ready for it. Hence we recommend that students who are entered for MOG are confident mathematicians, aged approximately 16-18.

They are likely to have already achieved some success at UKMT follow-on rounds or in the Mentoring Schemes.

The paper contains five questions to be answered in two-and-a-half hours.

We encourage all interested students to attempt previous MOG questions before entering the competition. Past papers can be found on our website at **www.bmos.ukmt.org.uk/home/ukmog.shtml**.

MOG also forms part of the process to identify potential squad members for the annual European Girls' Mathematical Olympiad and other international competitions. Therefore, students should be eligible to be part of the UK team (either eligible for a UK passport describing them as a British Citizen, or will have completed three full years of full-time secondary education in the UK by the time they leave school).

MOG will be held on Tuesday 2 October. To enter your student, please complete the entry form, before the closing date of Thursday 27 September, online at **www.surveymonkey.com/r/MOG_ENTRIES**.

Your registration will be acknowledged and the paper will be sent by email to our registered Senior or Intermediate Challenge school contact on Monday 1 October.

Entry to the competition is £20 per student, but this is waived for up to four entrants per school.

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**Can you attempt this question from the 2017 MOG paper?**

Claire and Stuart play a game called *Nifty Nines*:

(i) they take turns to choose one number at a time, with Claire choosing first;

(ii) numbers can only be chosen from the integers 1 to 5 inclusive;

(iii) the game ends when *n* numbers have been chosen (repetitions are permitted).

Stuart wins the game if the sum of the chosen numbers is a multiple of nine, otherwise Claire wins.

**Find all the values of *n* for which Claire can ensure a win, whatever Stuart's choices were. You must prove that you have found them all.**

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## Publications Snippets

Following on from **Intermediate Problems** and **Junior Problems**, it may not be a surprise to you that **Senior Problems** will shortly be launched.

The book contains problems used in the Senior Mathematical Challenge over the past 20 years, grouped together by difficulty and by topic.

Our full range of books can be purchased via Amazon or on our website at **shop.ukmt.org.uk**

## General Data Protection Regulation

EU data protection laws have changed since 25 May 2018.

You can view our updated privacy notice and other policies at **www.ukmt.org.uk/about-us/policies/**.

The privacy notice explains how we collect, store and handle your personal data, and how you can manage your personal data.

## Social Media

To keep up to date with all the news from UKMT, and to have a go at the weekly #UKMTProblem, follow us on Twitter @UKMathsTrust. We also have a

Facebook account /UKMathsTrust, Instagram, LinkedIn, and YouTube accounts.

We love to see and retweet pictures of you and your students involved in UKMT activities,

particularly on Challenge days, but to maintain security of our papers, please ensure that our material isn't accidently seen in the photo.

## 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.

**Enter our prize Sudoku!**

Please send entries (photocopies accepted) by the closing date of Friday 20 July 2018 to:

Sudoku,
UK Mathematics Trust,
School of Mathematics,
University of Leeds,
Leeds LS2 9JT

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



Entries are accepted from students, teachers and UKMT volunteers. A draw from the correct entries will take place after the closing date and the winner will receive a book with a mathematical theme and a UKMT Megaminx. The winning name and affiliation will be published in a future edition of UK Mathematics Trust News.

# Diary dates for 2018-2019

## Mathematical Challenges

| **Senior** | **Intermediate** | **Junior** |
|---|---|---|
| Tuesday 6 November | Thursday 7 February | Tuesday 30 April |

## Follow-on Rounds

| **Senior Kangaroo** | **Intermediate Kangaroo** | **Junior Kangaroo** |
|---|---|---|
| Friday 30 November | Thursday 21 March | Tuesday 11 June |
| **British Mathematical Olympiad Round 1** | **Intermediate Mathematical Olympiad** | **Junior Mathematical Olympiad** |
| Friday 30 November | Thursday 21 March | Tuesday 11 June |
| **British Mathematical Olympiad Round 2** | | |
| Thursday 24 January | | |

## Other events

| **Senior Team Maths Challenge** | **Team Maths Challenge** | **Mathematical Olympiad for Girls** |
|---|---|---|
| **Regional Events** | **Regional Events** | Tuesday 2 October |
| November-December | February-April | |