

Maths Challenges News

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The UKMT Maths Challenges are a great way to test and enhance your students' problem-solving skills, and entries are now being taken for this year's Senior, Intermediate and Junior Maths Challenges.

Over 650,000 students from around 80% of all UK secondary schools and colleges entered the Maths Challenges in 2014/15. But did you know that last year:

- there were 59 perfect scores in the Senior Challenge, 34 in the Intermediate Challenge, and 15 in the Junior Challenge;
- we awarded 36,620 gold certificates, 82,926 silver certificates and 120,691 bronze certificates across all three Challenges;
- 20,866 students were invited to participate in follow-on competitions;
- downloadable Certificates of Participation were introduced so that all those taking part could receive recognition. As usual, we also awarded certificates to those pupils who scored the highest in their year group and in their school.

Along with your individual results, we send out a detailed report about how your school performed against the nation. This can be a great way to discover some of your students' mathematical strengths and weaknesses. We also publish extended solutions to complement the shorter printer solutions leaflet posted to schools. This includes alternative solutions and extension materials and exercises for further investigation.

To enter this year's Maths Challenges, complete and return the entry form arriving in school this term, or download one from our website at www.ukmt.org.uk.

Intermediate Maths Challenge 2015, Q9:

According to a newspaper report, "A 63-year-old man has rowed around the world without leaving his living room." He clocked up 25 048 miles on a rowing machine that he received for his 50th birthday.

Roughly how many miles per year has he rowed since he was given the machine?

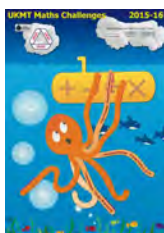
A 200 B 500 C 1000 D 2000 E 4000

For further investigation:

We are not told exactly how old the man is, but only that his exact age is between 63 years and 64 years. What is the corresponding range of values for the average number of miles he has rowed per year since his 50th birthday?

Poster Competitions Winner

Congratulations to Maia, Katie, and Georgie from Badminton Senior School for their creative underwater design, winning them first place in the annual UKMT poster competition. Their design has been recreated by Arbelos, and a copy of this poster is included with this mailing. See previous poster winners at <http://www.arbelos.co.uk/ChallengesPosters.html>



The judges were impressed with the high quality of the designs, and a special mention goes to Olivia, Ellie, Elizabeth and Sophie from Meadowhead School in Sheffield, and to Emily and Rebecca from Parkstone Grammar School, whose designs were highly commended. Thank you to all who participated and look out for the annual poster competition in the next Newsletter. In the meantime, why not see the competition on the back page and try your hand at designing a logo?

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Diary Dates for 2015-16

Maths Challenges and Follow-on Rounds

Challenge	Date	Follow-on Round	Date
Senior	Thursday 5 November 2015	BMO1 and Senior Kangaroo	Friday 27 November 2015
		BMO2	Thursday 28 January 2016
Intermediate	Thursday 4 February 2016	IMOK Olympiad	Thursday 10 March 2016
		IMOK Kangaroo	Thursday 17 March 2016
Junior	Thursday 28 April 2016	JMOK (Olympiad and Kangaroo)	Tuesday 14 June 2016

International Mathematical Olympiad 2015



UK 2015 IMO team with Dominic Yeo

Congratulations to this year's UK team at the International Mathematical Olympiad (IMO). Joe Benton (St Paul's School), Lawrence Hollom (Churcher's College), Samuel Kittle (Simon Langton Boys' Grammar School), Warren Li (Eton College), Neel Nanda (Latymer School) and Harvey Yau (Ysgol Dyffryn Taf) returned from the IMO in Thailand with four silver and one bronze medal, and an honourable mention. The UK finished 22nd out of 104 participating nations.

Our thanks go to those accompanying the team: Dr Geoff Smith (University of Bath), Dominic Yeo (Worcester College, Oxford) and Jill Parker (ex-University of Bath), and to our IMO supporters, Oxford Asset Management.

A full report about the 2015 IMO, including the questions, can be found at <http://www.bmoc.maths.org/>.

Next year's IMO will be held in Hong Kong, and if you think you have a student capable of representing the UK at international mathematics competitions such as the IMO, then the selection process begins with the UKMT's Senior Maths Challenge, taking place in November.

See the back page to find out more about the IMO coming to the UK in 2019, and how you or your students can be involved now.

Try Problem 2 from day 1 of the 2015 IMO:

Determine all triples (a, b, c) of positive integers such that each of the numbers

$$ab - c, \quad bc - a, \quad ca - b,$$

is a power of 2.

(A power of 2 is an integer of the form 2^n , where n is a non-negative integer.)

Mentoring Schemes

Are you looking for additional support to stretch and inspire your most able and willing young mathematicians? If so, the UKMT Mentoring Schemes may be able to help. These monthly problems sheets are sent out electronically to those registered for the schemes from October. At the Junior and Intermediate levels, most students are mentored by their teacher using material supplied each month by UKMT. Students participating in the Senior scheme are usually mentored by an external volunteer. To find out more about registering your students or volunteering as a mentor, please email mentoring@ukmt.org.uk or see <http://www.ukmt.org.uk/mentoring/>.

Our thanks go to Oxford Asset Management for their ongoing support of the mentoring schemes.

OxFORD
ASSET MANAGEMENT

Junior Mentoring Scheme—Q1, November 2014

A box contained 31 sweets. On Monday Sam ate $\frac{3}{4}$ of the number that Pam ate. On Tuesday, of those left, Sam ate $\frac{2}{3}$ of the number that Pam ate. No sweets were left. How many sweets did Sam eat?

Intermediate Mentoring Scheme—Q4, December 2013

A palindromic number is one that reads the same when its digits are reversed, such as 2332. What is the largest palindromic six-digit number that is exactly divisible by 6?

Student Involvement with Team Challenge Events

In March, myself and nineteen other Year 12 students from Tonbridge Grammar School had the privilege of helping out with one of the UKMT Team Maths Challenge (TMC) Regional Finals, which was hosted by our school. Although the event was run by the UKMT, our roles included greeting and registering the 30 teams, answering any questions, and collecting the answers and scrap paper at the end of each round. It was a real honour to see how the challenge was organised and run, and it was a great learning experience, as in April we then had to organise and host our own maths challenge for primary schools in the area.



Students at a 2015 UKMT Team Maths Challenge

We had to create the questions for the primary event ourselves and, although we had a lot of support from the UKMT and the teachers at our school, we essentially had to run the whole day too. There were six components of the challenge that we had to create: the starter activity, the four rounds of questions and the Supervisor's Booklet (containing all the answers). We split ourselves into six groups and each group took on one component of the challenge to create. Luckily, everyone was committed and we had everything prepared well before the day of the competition.

On the day of the primary event, we all took on various roles. We had to explain the rounds to the teams, and then organise and supervise them throughout the day. We also had to do the announcing and keep track of the scores throughout the day. Although it was quite hectic at times, the event ran smoothly and we all enjoyed running the competition immensely.



Tonbridge Grammar School students with the winning team at their event in the Netherlands.

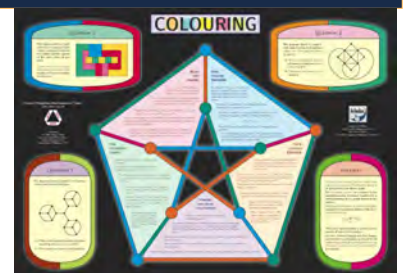
In June, we had the pleasure of going to Utrecht in the Netherlands to run a team maths day for local Dutch secondary schools. The host school was extremely hospitable and we all absolutely loved running the event in the Netherlands. The whole trip was a great success.

The entire experience of helping out with a UKMT TMC Regional Final and organising our own events, in both the UK and the Netherlands, was a little difficult at times, as there was a lot of responsibility when we were running the days ourselves. However, we have all gained many useful skills and had a lot of fun in the process. This experience is something that we will all cherish forever and if the possibility of helping out with the UKMT ever arose again, I am sure that we would all jump at the chance.

By Alex Hann, Tonbridge Grammar School.

UKMT Team Challenges

Congratulations to Westminster Under School, who lifted the Team Maths Challenge trophy at the 2015 National Final, and The Perse School, Cambridge, for winning the Poster Competition. Entry details and dates for the 2016 **Team Maths Challenge** regional events will be available from our website in early October.



Winning poster from 2015 National Final

This year's **Senior Team Maths Challenge** (STMC) will be taking place shortly at 63 venues across the UK for students aged 16 -19. Enter a team today by completing the entry form at <http://www.ukmt.org.uk/team-challenges/senior-team-challenge/>.

Resources are also available for secondary schools to run team events with their feeder primary schools. More information about the **Primary Team Maths Resources** can be found at <http://www.ukmt.org.uk/team-challenges/primary-team-maths-resources/>.

Team Maths Challenge—Relay Round Regional Finals 2015

Harry eats 35% of a cake, Martha eats 15% of it and Joshua, who does not understand percentages yet, eats one fifth of it.

What fraction is left for their grandmothers to eat?

Primary Team Maths Resources—Group Round 2015

In a recent class quiz, Alicia answered all of the forty questions. A correct answer scored three points and an incorrect answer meant that you lost one point.

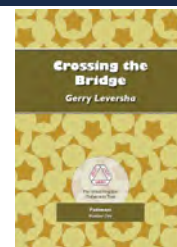
Alicia scored 60 points.

How many questions did Alicia correctly answer?

Publications Snippets

If you are looking for a course on geometry for use in the classroom, look no further than *Crossing the Bridge* by Dr Gerry Leversha. The bulk of this book is devoted to carefully constructed exercises, re-emphasising some traditional features of geometrical education, and is ideal for class discussion or individual study for those aged 13 and above.

To find out more about this book and other UKMT publications, including Challenge and Olympiad preparation materials, please see <http://www.ukmt.org.uk/publications>.



UKMT Teacher Meetings



Thanks to all those who attended our teacher meetings at the end of the summer term. With stimulating sessions from NRich, the National STEM Centre, UKMT, and key speakers including Katie Chicot, Rob Eastaway, James Grime and Colin Wright, it was a great opportunity to spend a day working on mathematics beyond the curriculum; take away ideas and material to use in the classroom; and meet fellow teachers.

Our dates and venues for the 2016 Teacher Meetings will be released early in the New Year, and further information can be found at <http://www.ukmt.org.uk/outreach/teacher-meetings/>. We hope to see you at one of these events!

Design the IMO 2019 Logo Competition

The International Mathematical Olympiad (IMO) is coming to the UK in 2019, and we are seeking your help in designing a logo for this prestigious event! The UK last hosted the IMO in Glasgow in 2002, where we welcomed over 500 students from around 80 countries worldwide. In 2019 we expect to host over 600 young mathematicians from more than 100 countries around the globe, and run a programme of national outreach events to celebrate and promote mathematics in this country.

Can you design a logo for the 2019 IMO? The IMO 2019 logo design competition is open to all amateur artists and designers who support the aims of UKMT.

Full terms and conditions, and further details about how to enter can be found at <http://www.imo2019uk/logo/>.



The logo should be bold and clear, and suitable for use in a wide variety of locations including websites, documents, clothing, banners, and stickers. There is no restriction on the theme, but note that IMO 2019 will be the diamond jubilee (60th) IMO and will be the third British IMO. The logo from IMO 2015 in Thailand is pictured, and links to previous logos are available via <http://www.imo2019uk/logo>. Recent IMOs have used an elephant (Thailand), Table Mountain (South Africa), coffee (Colombia), dice (Argentina) and the symbols for zero and infinity (Netherlands), for their logos.



IMO logo from the 2002 event

Submissions must be electronic, with each submission taking the form of an email to logo@imo2019.uk sent on or before 23.59 GMT on November 30th 2015.

The competition will be judged by an expert committee appointed by Dr Ceri Fiddes, Competition Director of IMO 2019. The identities and affiliations of entrants will be hidden from the judges. The winning name will be published in a future Newsletter, and the judges' decision will be final.

The prize will include a UKMT goody bag and a £50 book token. The school most closely associated with the winning entrant will receive a full set of current UKMT books free of charge, for use in its mathematics department or library.

We look forward to receiving your entries!