

United Kingdom  
Mathematics Trust

# UK Mathematics Trust News

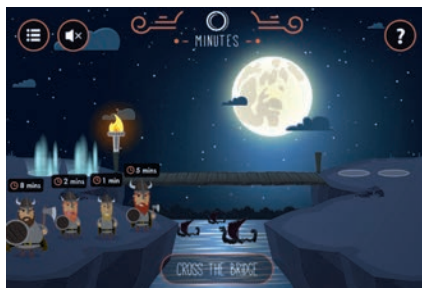
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## Prepare to be Perplexed!

We are pleased to announce the launch of our first ever game app. Developed in collaboration with the Open University, Perplex aims to stimulate interest in mathematical problem solving among young people and adults.



Perplex has eight interactive main puzzles inspired by classics such as map colouring, the knight's tour, and the bridge and torch problem.

In addition to the main puzzles, there are 40 daily challenges, all

based on problems from UKMT Mathematical Challenges.

Players are awarded stars, according to how many attempts they take to answer problems correctly, and can compete against their friends by linking the app to Facebook.

We hope that playing the game will encourage young people and adults to talk about these interesting problems, help to raise awareness of the classical puzzles, and promote the Mathematical Challenges — and other UKMT activities — to a wide audience.

Play Perplex for free online  
[www2.open.ac.uk/  
openlearn/perplex/](http://www2.open.ac.uk/openlearn/perplex/)  
or download the app from the Apple App Store or Google Play Store.

Let us know how you get on  
[@UKMathsTrust](https://twitter.com/UKMathsTrust)

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## A daily challenge problem from *Perplex*

**DAILY CHALLENGE**

		1				
	2	3	4			
5	6	7	8	9		
10	11	12	13	14	15	16

If the pattern shown is continued, what number will appear directly below 400?

438   439   440   441   442

## The approaching round of Mathematical Circles

Have you considered sending some of your enthusiastic Year 10 and S3 students to a Mathematical Circle event?

These free two-day non-residential events take place at

various locations around the country, and aim to promote mathematical thinking and provide an opportunity for participants to meet other students who enjoy the subject. Take a look at [www.ukmt.org.uk/outreach/mathematical-circles](http://www.ukmt.org.uk/outreach/mathematical-circles) for a list of the upcoming events for 2018 and to find out more.

If there isn't an event near your school and you might be interested in hosting an event in future, please get in touch with us at [enquiry@ukmt.org.uk](mailto:enquiry@ukmt.org.uk). We are particularly interested in extending coverage to Northern Ireland. Equally, if you might be interested in giving a session at one of these events, please get in touch for more information.

## A word from our sponsors

Thank you to all our donors and sponsors who have supported us throughout the year. As a registered charity, we rely heavily on a mix of income streams to enable us to continue our work – from entry fees, to publication

sales, to generous donations, and the support from our key sponsors.

We are currently seeking a sponsor for our Team Maths Challenge. To find out more about supporting our work, please contact the UKMT Director, Rachel Greenhalgh, on [enquiry@ukmt.org.uk](mailto:enquiry@ukmt.org.uk)

We also welcome one-off and monthly donations from individuals to support our work to advance the education of young people in mathematics.

Donate online at [www.ukmt.org.uk/about-us](http://www.ukmt.org.uk/about-us)

## OxFORD ASSET MANAGEMENT

OxFORD Asset Management is proud to be a sponsor of the UK Mathematics Trust. We are a research and investment firm in the heart of Oxford, employing over 90 people. Most of us have degrees in mathematics, computer science, physics, or econometrics from the world's

leading universities. Our colleagues include a number of Olympiad competitors and winners.

Through our research and software groups, we use quantitative, computer-based models to find patterns and anomalies in financial markets to generate a return for our investors, which include institutions such as pensions and

university endowments throughout the world. Our models rely on analysing as much data as we can gather. We enjoy tackling difficult problems, and strive to find better solutions.

We're always looking for talented people to join us. A background in finance is not necessary. Contact one of our partners, [tom.newcomb@oxam.com](mailto:tom.newcomb@oxam.com), if you're interested.



Institute  
and Faculty  
of Actuaries

## Apprenticeships for the maths lovers

2017 saw the introduction of the apprenticeship levy and the very first actuarial apprenticeship run with City & Guild and BPP.

The current apprenticeship is a Level 4, which applies to those students leaving school who want to start earning while they learn instead of going to university. In

2018 there will also be the launch of a Level 7 apprenticeship scheme. Information about that will be released when the scheme has been finalised.

Whilst the apprenticeship is a new venture for the actuarial industry there are a number of employers who have roles available. You can view those on our website [www.actuaries.org.uk/become-actuary/actuarial-apprenticeships](http://www.actuaries.org.uk/become-actuary/actuarial-apprenticeships)

Students, alongside their employer, choose whether they embark on the IFoA or CAA

Global exam pathway. Both options give students the opportunity to work towards an actuarial professional qualification as well as gaining on-the-job work experience – something vital for their career.

If you would like to find out more visit our website or call Jenni Hughes on **020 7632 2137** or email her at [jenni.hughes@actuaries.org.uk](mailto:jenni.hughes@actuaries.org.uk).

She will also be able to organise a careers talk at your school in the New Year if you would like to hear directly from those working in the industry.

## IMO Lecture and Celebration

Each year schools and colleges who have students participating in the BMO1 rounds are invited to attend the International Mathematical Olympiad (IMO) lecture and presentation. At this event, the audience hears about the UK's performance at recent international mathematics competitions, in particular, a brief report from the IMO team, followed by a mathematics lecture from a specially invited guest.

One of the attending students, Alice Ardis (Old Palace of John Whitgift School), tells us more.

Last September, our Year 12 Further Mathematics class attended the UKMT 40th International Mathematics Olympiad (IMO) Lecture at the Science Museum. The event was to celebrate the fantastic achievements of the UK Mathematics team at the recent IMO in Brazil and in other International Mathematics competitions during the previous year. The review of the various teams achievements was followed by a talk given by Dr Vicky Neale, of Oxford University, on the intriguing, and surprisingly broad, topic of prime numbers.

This was certainly very informative, and made all of us think of prime numbers in a new

way. For instance, apart from 2 or 3 every prime is one more or one less than a multiple of 6. Of course, this is because all other numbers are multiples of two or three, but it is a topic of debate whether the primes are evenly distributed between these two possibilities. We also learned not only that trends in the gaps between prime numbers are an



extremely active field of research but also about the way in which mathematicians across the globe are attempting to solve problems collaboratively using the Polymath project. Yitang Zhang proved that there are infinitely many pairs of primes at most 70 million apart. The Polymath project led to extremely fast progress, reducing this number from 70 million to 600 within the year, the eventual goal being two. This research will undoubtedly have essential applications in

cryptography and digital security.

Dr Vicky Neale said of the event, "I was honoured to meet so many enthusiastic young mathematicians at the UKMT celebration at the Science Museum. The teams that represented the UK at the International Mathematics Olympiad, the European Girls' Maths Olympiad and the other international competitions did exceptionally well last year. It was great also to see many more students in the audience and to be able to share news of recent breakthroughs in our understanding of prime numbers with them, since these students will be amongst the mathematicians of the future."

All in all, it was an incredible experience to attend this talk, and witness the achievements of the UK Mathematics teams – the UK IMO team included a girl for the first time in several years. It was an honour for the school to be invited, and we now surely have something to aspire to!

Dr Vicky Neale's lecture can be viewed at  
**[youtu.be/ZhFaqOS4uxs](https://youtu.be/ZhFaqOS4uxs)**

Why not show it in the classroom?

## Publications snippets

*Intermediate Problems* contains every problem used in the Intermediate Mathematical Challenge from 1997 to 2016, but these are not given as multiple-choice questions. The problems have also been grouped together in two ways: by difficulty, and by topic.

Our full range of books can be viewed at **[shop.ukmt.org.uk](https://shop.ukmt.org.uk)**. UKMT books can also be purchased via Amazon.

### Two questions from *Intermediate Problems*

The Pythagoras Patisserie sells triangular cakes at 39p each and square buns at 23p each. For her party, Helen spent exactly £5.12 on an assortment of these cakes and buns.

How many items in total did Helen buy?

Baldrick can afford to buy either 6 parsnips and 7 turnips or 8 parsnips and 4 turnips. Both options leave him with no change whatsoever.

If, however, he bought only his beloved turnips, how many could he afford?

## Annual student poster competition

Can your students design a poster to advertise next year's Mathematical Challenges?

Entries are accepted from teams of students or from individuals, and the competition is open to all school-aged children.

The winning poster will be reproduced and sent to all UK secondary schools and colleges with the autumn newsletter.

Last year's poster is shown on the right, and you can see previous posters at [www.arbelos.co.uk/ChallengesPosters.html](http://www.arbelos.co.uk/ChallengesPosters.html).

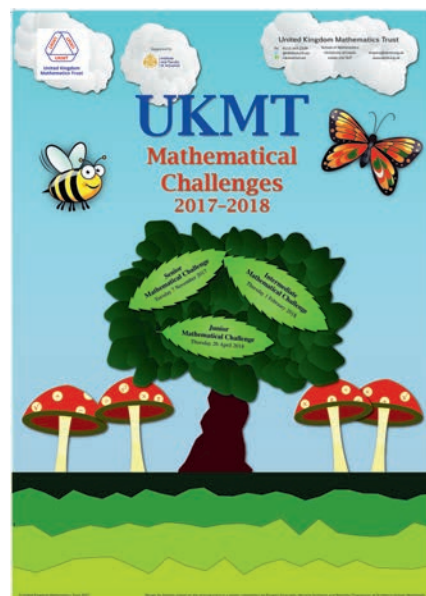
## Poster competition rules

1. Use A2 paper in portrait orientation.
2. Include the words "UKMT Mathematical Challenges 2018–2019".
3. Include the following dates:  
Senior Challenge  
Tuesday 6 November 2018  
Intermediate Challenge  
Thursday 7 February 2019  
Junior Challenge  
Tuesday 30 April 2019
4. Write your name(s), age and school details (clearly!) on the back of the poster. These details should not be written on the front.

The submitted poster does not need to include our logo, or the logo of our sponsor—these will be added to the winning poster.

We regret that we are unable to accept electronic entries and we cannot return posters.

The winning names will be published, and the judges' decision is final.



Please send entries by the closing date of **Wednesday 28 March 2018** to:

Poster competition,  
UK Mathematics Trust,  
School of Mathematics,  
University of Leeds,  
Leeds LS2 9JT

## Issue 55 Prize Sudoku winner

Well done to Kerry from St Mungo's Academy, Glasgow, who wins a book and a Megaminx puzzle!

## Diary dates for 2018

## Mathematical Challenges

### Senior

Tuesday 6 November

### Intermediate

Thursday 1 February

### Junior

Thursday 26 April

## Follow-on Rounds

### British Mathematical

#### Olympiad Round 2

Thursday 25 January

### British Mathematical

#### Olympiad Round 1

Friday 30 November

### Intermediate Kangaroo

Thursday 15 March

### Intermediate

#### Mathematical Olympiad

Thursday 15 March

### Junior Kangaroo

Tuesday 12 June

### Junior Mathematical

#### Olympiad

Tuesday 12 June

## Team Maths Challenges

### Senior Team Maths Challenge

#### National Final

Tuesday 6 February

### Team Maths Challenge

#### National Final

Monday 18 June