



Welcome to the sixth issue of our Newsletter.

In these Coronavirus-driven times we thought it would be nice to introduce our team that makes up the Executive Committee and give a human face to each of us. So here is our Rogues Gallery:



Katie Chicot, CEO



Geoff Wain, Co-Chair



Margaret Brown, Co-Chair



Jack Abramsky



Huw Kyffin



Kit Yates



Ruth Holland



Roger Fiskin



Catherine Griffiths



Jason Davison, Treasurer



The past twelve months

The past twelve months have been very productive ones for MathsWorldUK. Our first big news is that, after much fundraising, we have managed to develop our first Touring Exhibition. We appointed a manager for the exhibition and installed it in the Winchester Science Centre ready to be visited when public places re-open.

We have had a number of important meetings with land developers, with museums in Leeds and in London, with Leeds City Council, the University of Leeds and Newcastle City and Universities and we are developing Memoranda of Understanding with those organisations that can further our goal. We have met with representatives of the British Library, held an important meeting at The Royal Society and had discussions with Zaha Hadid Architects. We have become a Partner in the Northern Powerhouse consortium and will seek opportunities with this group.

We have appointed a number of Ambassadors to further our cause, and we have set up specific interest groups, including content groups, finance groups, property and development groups and a Touring Exhibition Group.

As usual we have also participated in local science fairs, most recently in Leeds and in Bradford, and we are in ongoing discussions with the UK Space Agency and the Association of Science Discovery Centres about future outreach work. In February we ran a Café Scientifique panel event on Artificial Intelligence, and we ran, for the fourth successive year, the Schools 'Maths Miniatures' video competition.



We continue to strengthen our relationship with the University of Leeds. We have appointed Professor Tom Ward as a trustee. Tom is a mathematician and Deputy Vice-Chancellor (Student Education) at the University of Leeds. Tom's research is in ergodic theory and its relation to number theory. We are delighted to welcome Tom to MWUK.

Our charity trustees and company directors can be found on our website.

We are making progress towards our goal and it is essential to keep the momentum going. Obviously, this is going to be difficult during the Coronavirus pandemic, but we will continue to work at a distance, as necessary, to promote MWUK.

Possible sites for Our Discovery Centre

We have made some progress about a future site. There are ongoing discussions with several possible venues including with the Royal Armouries Museum in Leeds. Also, we have just begun exploring the possibility of collaborating with the Royal Museums Greenwich, in particular with the National Maritime Museum. Greenwich is a marvellous setting and the museums there get an annual footfall of several million visitors. At the very least, we certainly hope that RMG will be one of the venues of the Touring Exhibition.



Touring Exhibition

We have appointed a manager, Dr James Grime, to oversee our first touring exhibition and any others that may follow in due course.

James is a mathematician and public speaker. He has run The Enigma Project since 2008 and visits schools and festivals in the UK and around the world, talking about the history and mathematics of codes and code breaking. James is also a presenter of the YouTube channel *Numberphile* and other YouTube videos.

James is responsible for the day to day management of the tour, including booking the locations for the exhibition, so if you would like to host the exhibition (for at least 3 weeks) then email James at: admin@mathsworlduk.com.

Our first Touring exhibition has just been set up at the Winchester Science Centre; it is called Explore Maths (see photo below) and it is essentially about problem solving. Unfortunately, on the day it was set up, The Winchester Science Centre closed to the public as a result of the Coronavirus pandemic. This will be a recurring story but do keep looking at our website for updates and developments. We already have on the website more information about the touring exhibition and a number of activities which you can try. We are due to exhibit at several Scottish Science Discovery Centres in September and October, but this will be dependent on the rules around public gatherings at that time.



Financial Appeal

MathsWorldUK has had a very successful twelve months since last March. We have almost matched the £125,000 offered to us by an anonymous American donor, but we are still a few thousand short of perfect matching. We have until the end of this year to achieve the full matching. As we went to press for the last issue of this Newsletter we reported that we had been pledged £1million by the Simon Norton Foundation. This pledge is also conditional on matched funding being achieved from other sources.

Simon Norton's brother, Michael, who administers the Simon Norton Foundation fund, is now taking an active role in helping MWUK to move towards its ultimate goal and we have together arranged a number of successful and interesting meetings to push our project forward.



Michael, who is the Director of the Centre for Innovation in Voluntary Action (CIVA), has also said that CIVA has generously offered us an additional £300,000 to promote and develop our business plan, especially as regards fund-raising and to appoint a professional fundraiser to do this. We shall also use some of this money to explore possible sites and carry out site analyses with developers and architects. We cannot thank Michael and CIVA enough for their generosity. Michael is well connected and is recruiting contacts to help promote MWUK in all sorts of ways. We thank him for his efforts so far and know that through his generosity we are making good progress to our ultimate goal.

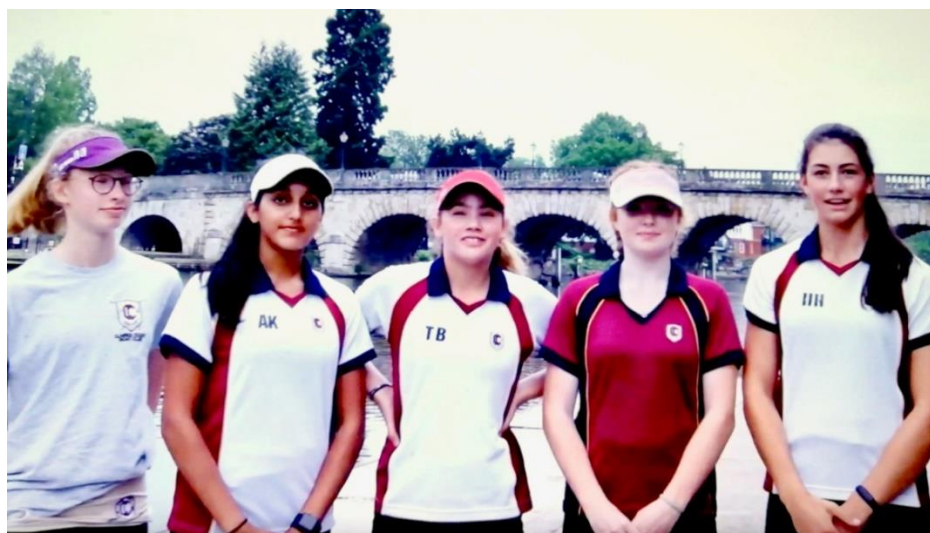
We are almost there!

We thank all those individuals and institutions who have contributed to our cause. But we still need more. Please help us move towards our two matched funding goals, either through a personal donation or through spreading the word to foundations, philanthropists and other possible donors. Donations can be made through our website www.mathsworlduk.com. Also, do send us names of possible benefactors we might approach.

Schools Video Competition: Maths Miniatures 2019

We again collaborated with the University of Leeds, United Kingdom Mathematics Trust and IMO2019 Ltd to run our annual short film competition for schools. This year the theme was *Mathematics in Sport*. Students aged 11-18 across the UK were challenged to work in small teams to produce a 3-minute video exploring this topic and communicating the mathematics involved. We had a great deal of interest with 91 schools submitting videos.

Once again, the standard was very high and two rounds of judging were needed to identify a winner. Our judges first produced a long list of 47 entries, and then the seven highest-scoring videos were rescored by our judging panel.





First prize went to the team (pictured) from Claires Court Schools, Maidenhead whose winning entry was entitled *Rowing Moments*.

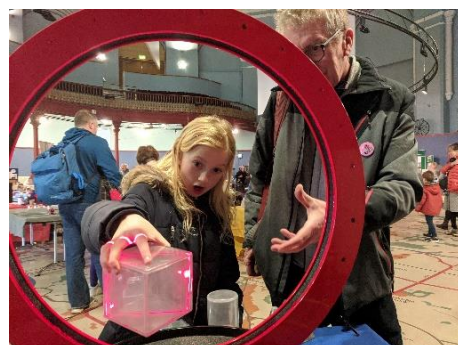
Six further teams were shortlisted for first prize. They were, in alphabetical order: Colfe's School, Haberdashers' Aske's School for Boys, Lambrook School, Mary Hare School, St Benedict's Upper.

Many congratulations to all participants and thanks to all the schools and teachers for their support.

You can view the shortlisted videos on [YouTube](#).

Participation in Mathematics and Science Fairs

As in previous years, MathsWorldUK has been represented at a number of fairs around the country. A selection of photographs from these events showing a wide range of the activities available is below. We also spent a week at a summer camp in a community centre in inner city Leeds running maths enrichment sessions for all ages.





Artificial Intelligence Panel Event

In February MathsWorldUK hosted a public event on the topic of Artificial Intelligence (AI), one of the Grand Challenges of the UK Industrial Strategy. This event was supported by UK Research and Innovation, through our collaboration with The University of Leeds and the Leeds Festival of Science.

We were pleased to welcome an impressive line-up of panelists: Dr Zoë Webster (Director - AI and Data Economy at UKRI), Professor Charles Taylor (Professor of Statistics - University of Leeds) and Gabriela Arriagada Bruneau (Postgraduate Researcher - AI & Big Data Ethics), with our own Katie Chicot chairing the session.

Each expert presented us with information and views from their experience in this important and burgeoning field before opening up to questions from a lively and engaged audience. We were left with standing-room only as 120 people gathered to participate in the session, which was run as part of the Café Scientifique series.

We discussed where AI is already being used from helping with medical diagnoses to reducing food waste, what it may be capable of in the future and the practical limitations of what AI can achieve. There are numerous potential benefits from AI, but there was also a note of caution due to the potential problems that AI might create and so we considered the importance of operating within an ethical framework.



Involving a diverse workforce in the development of such technologies is essential to try to minimise bias within the systems. In addition it will be vital to reconsider how staff are trained in areas where AI is being employed to avoid the loss of human expertise - people still need to be able to notice cases that AI is misunderstanding to avoid errors and to further how the machine learns to recognise these new categories of data.

Mathematics is at the heart of this increasingly important technology but it is crucial that we engage with the ethics at every stage of its development.

Our Ambassadors

We are recruiting celebrities and others to act as Ambassadors for MWUK. The Ambassadors will spread the word about MWUK whenever they can, using the range of skills and attributes they bring to the job. Our Ambassadors include Dermot Turing, Hannah Fry, Matt Parker, and Colin Wright. The full list of our Ambassadors is on our website. We are extremely grateful to all who have stepped forward. MWUK would like to send special congratulations to Hannah Fry for creating an excellent set of memorable Royal Institution Christmas Lectures. With thanks too to Matt Parker for being such a good sport in the lectures.



Dermot Turing



Hannah Fry & Matt Parker

Coronavirus



Photo: Imperial College

Just to note that mathematical modelling is at the forefront of understanding the spread of the COVID-19 virus and in influencing governmental policies around the world. Professor Neil Ferguson is a mathematical epidemiologist at Imperial College, London, whose recent work has been instrumental in reshaping the UK government's approach to handling the pandemic crisis. Professor Ferguson should be proclaimed a national hero for his work on the virus.



Other recent maths news



Photo courtesy of Getty Images

The pioneering African-American mathematician Katherine Johnson has died at the age of 101. Katherine's work helped to calculate the trajectories and spatial adjustments to orbits that enabled NASA (and its predecessor the National Advisory Committee for Aeronautics) to send the first American into space in 1961 and later to send men to the moon and make the first moon landing in 1969. In the days when computers were still in their infancy, Katherine and her team of fellow African-Americans verified all the computer calculations by hand! John Glenn, the first American to orbit the Earth, said he would only go on his epoch-making mission if all the calculations were hand-checked by Katherine. Katherine Johnson and her contribution to the success of the American space programme were celebrated in the recent excellent Hollywood biopic *Hidden Figures*. In 2015, President Obama presented Katherine with the Presidential Medal of Freedom, the highest civilian honour in the USA.

Quarantine Puzzles

There are lots of ways to keep yourself occupied indoors whilst the storm passes. Here are a couple of puzzles for you to wrestle with when you are idle.

Warm up: Can you place arithmetic signs + - x / () between the nine digits so that they equal 100? You may not change the order of the numbers.

$$1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9 = 100$$

Grand finale: King Arthur sat at the round table on three successive evenings with his knights Beleobus, Caradoc, Driam, Eric, Floll and Galahad, but on no occasion did any person have as his neighbour one who had before sat next to him.

On the first evening they sat alphabetically around the table.

But afterwards King Arthur arranged the sittings so that Beleobus was as near to him as possible and Galahad as far away from him as could be managed. How did he seat the knights on the two nights?