

## **Mathematics brought to life by the Millennium Mathematics Project (Workshop Summary)**

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### **Abstract**

This workshop aims to share the success of the Millennium Mathematics Project (MMP) in bringing mathematics to life for students and teachers. A range of interactive enrichment programmes and their innovative ideas and resources will be shared. Two MMP outreach projects will be explained in detail as the main focus of the workshop: (1) The Enigma Project, (2) The Risk Roadshow. Both projects travel to primary and secondary schools as well as universities, organisations, science festivals and residential camps, both nationally and internationally.

### **Introduction to the Millennium Mathematics Project**

The Millennium Mathematics Project is a mathematics education initiative for ages 5 to 19 and the general public, based at the University of Cambridge, UK. The aim of the MMP is to support mathematics education and promote the development of mathematical skills and understanding, particularly through enrichment activities. More broadly, we want to help everyone share in the excitement and understand the importance of mathematics.

The project consists of a family of complementary programmes, each of which has a particular focus:

- [NRICH](#) website - thousands of free resources designed to develop problem solving skills and subject knowledge.
- [Plus](#) website - an online magazine opening a door to the world of mathematics, including a careers library.
- [Motivate](#) video-conferencing programme - linking schools to professional mathematicians and scientists to engage in investigative project work.
- Visits to schools all over the UK and abroad by the [Hands-On Maths Roadshow](#), [Enigma Project](#), [Risk Roadshow](#) and [NRICH](#) staff.
- The [Cambridgeshire Further Mathematics Centre](#) - teaching, support and promotion of Further Maths A-level.
- [Popular mathematics lectures](#) for schools and the general public, held in Cambridge.
- [STIMULUS](#) programme - placing Cambridge student volunteers in local schools to assist with mathematics and science classes.

The MMP's various programmes have won many awards and our resources have been repeatedly commended by the UK Government's Department for Children, Schools and Families (formerly the Department for Education and Skills). Our web-based mathematical resources attract more than 2.3 million visitors worldwide, and around 30,000 pupils and teachers annually are involved in our hands-on activities. In February 2006 the Queen presented the project with the Queen's Anniversary Prize for Higher and Further Education (the counterpart to the Queen's Award for Industry), honouring 'outstanding achievement and excellence' at world-class level.

### **The Enigma Project**

[www.mmp.maths.org/enigma](http://www.mmp.maths.org/enigma)

[www.enigma.maths.org](http://www.enigma.maths.org)

The [Enigma Project](#) aims to inspire interest in mathematics, science and history through interactive presentations and hands-on workshops focusing on the mathematics behind cryptography – the

science and mathematics of codes and codebreaking. Presentations include a demonstration of a real WWII Enigma cipher machine, loaned to the project by Simon Singh. All delegates attending this workshop will have the unique opportunity to see the Enigma cipher machine in action.

The opening 50-60min interactive presentation introduces students to cryptography. Pupils meet various ciphers used throughout history from Ancient Greece, they see the WWII Enigma cipher machine in action, find out how it worked, and discover why it is one of the most infamous cipher machines of all time.

Students then get the chance to put their problem solving and logical reasoning skills to the test by taking part in a circus of hands-on code breaking activities. The code breaking workshops last for 50-60min with class-sized groups of pupils working in pairs to crack cryptic messages using a variety of traditional and modern methods from Caesar shift ciphers to ISBN numbers. These activities and ideas as well as the [Code Book CD-ROM](#), will be shared during this workshop for future use in the classroom.

### **The Risk Roadshow**

[www.mmp.maths.org/risk](http://www.mmp.maths.org/risk)

[www.understandinguncertainty.org](http://www.understandinguncertainty.org)

In January 2009, the MMP launched the new Risk Roadshow, in collaboration with Professor David Spiegelhalter, Winton Professor of the Public Understanding of Risk in the Department of Pure Mathematics and Mathematical Statistics, University of Cambridge.

The Risk Roadshow is part of a movement called 'risk literacy', aimed at teaching students the statistical skill they need to make sensible life decisions, which is often ignored in the curriculum. Below are links to the latest media reports of its importance and impact in schools.

**'Probability lessons may teach children how to weigh life's odds and be winners':** *The Times*, 5th January 2009

[www.timesonline.co.uk/tol/news/uk/education/article5446920.ece](http://www.timesonline.co.uk/tol/news/uk/education/article5446920.ece)

**"Risk literacy" for high schoolers gains currency in bid to boost decision making:** *Chicago Tribune*, 1st March 2009

[www.chicagotribune.com/news/nationworld/chi-london-risk\\_goeringmar01,0,631696.story](http://www.chicagotribune.com/news/nationworld/chi-london-risk_goeringmar01,0,631696.story)

It bridges the gap between classroom Mathematics and its application in the real world through interactive presentations and workshops.

The opening 50-60min interactive presentation helps students to make sense of the real world through mathematics in situations involving risk, probability, chance and uncertainty. It helps to provide answers to questions such as: What risks do we face in the world? If it sounds too good to be true, what haven't you been told? Is it worth playing the lottery? How can you increase your chances of winning a game? Can you spot a scam before you fall for it?

Following the presentation, students participate in a 50-60min 'Mathionaire Gameshow' workshop, answering multiple choice questions based on the presentation. Each student will use an interactive handset to respond to the questions, receiving instant feedback of results. All delegates attending the workshop will have the opportunity to see and trial this technology.

### **Conclusion**

Teaching and learning mathematics presents challenges. The Millennium Mathematics Project offers an abundance of educational resources, ideas and opportunities to help with these challenges, bringing mathematics to life. The Enigma Project and Risk Roadshow are unique and innovative experiences which challenge, excite and motivate students of all ages and abilities. All delegates attending this workshop will see this for themselves and take away valuable resources and ideas to enhance the teaching and learning of mathematics in their respective countries