



A rendering of the upper level of the Museum of Mathematics, which opens in New York later this year.

Q&A Glen Whitney

Maths demystifier

Mathematician Glen Whitney left a job in finance to set up the Museum of Mathematics (MoMath), which is due to open in Manhattan, New York, on 15 December. He wants to spread the word that mathematics is a beautiful discipline and all around us, from the geometry of soap bubbles to the algorithms that control traffic lights.



How did you start out in mathematics?

When I was young, I broke my collarbone playing soccer and fell in love with maths problems while recuperating. I had a voracious appetite

for mathematics in high school but when I went on to Harvard had no illusion that I was going to be one of the top researchers in the country. After teaching at the University of Michigan, I received an offer to try statistical trading at Renaissance Technologies in New York, a hedge fund run by mathematician Jim Simons. I decided to give it a try. I started out in the data group, then migrated into researching trade strategies and on to improving the research tools themselves. It was exciting and intellectually demanding, but I wanted to do something beneficial to society at large.

Why did you focus on the public image of mathematics?

The National Security Agency views the shortage of US mathematicians as one of

the country's biggest security threats. Yet you often hear people say, "I was always terrible at maths". No one says that about reading. I believe this attitude stems primarily from the emphasis on rote procedures and people paying too little attention to making connections with everyday life and the world around them. We need a cultural institution to combat this prejudice.

And why a museum?

Many science museums are sparse on maths content. A lack of contemporary mathematics exhibits means that one from 1960 is still housed at the New York Hall of Science and the Museum of Science in Boston, Massachusetts. When kids see chemistry and physics exhibits but none on mathematics, it conveys a subtle but powerful message. The United States used to have one museum of mathematics — on Long Island, New York — but it was so small you had to gather ten people for it to open. It closed down in 2006 and I realized that was an opportunity to create an environment for people to have seminal experiences with mathematical concepts, to show that maths is as much a

part of our society as the other sciences.

What will a visitor find at your museum?

Hands-on exhibits showing how mathematics can be tangible, open-ended and fun. In the new museum, we will have exhibits on everything from the beautiful patterns created by video feedback to the probabilities of making a free throw in basketball.

Have you debuted any of your exhibits?

Yes, in a travelling exhibition, the *Math Midway*, which has appeared at science museums and festivals across the country, and will continue to tour beyond the museum opening. Its iconic exhibit is a square-wheeled tricycle that rides smoothly over a surface of inverted catenary curves calculated to keep the axles of the tricycle level as the corners of the wheel rotate, which seems to give people the sense that maths can make the impossible possible. Another exhibit is a plane of laser light that shows all of the possible cross-sections of translucent three-dimensional solids. Visitors can rotate a cube to learn that it can be sliced to yield not just squares and triangles, but trapezoids, rhombuses and even a regular hexagon that cuts through all six faces.

What else are you doing until the museum opens?

MoMath holds a monthly lecture series called Math Encounters in which we strive to show unexpected ways that maths touches everyday life — such as in the geometry of soap bubbles. Upcoming presentations include a talk about the maths of sport, and one on the maths of origami.

What sets MoMath apart from other mathematics outreach and education efforts?

Besides the fact that MoMath will be the only museum in North America devoted specifically to mathematics, there are a few distinctive aspects to its approach: a focus on physical interaction, especially whole-body involvement; an effort to show as broad a spectrum of the world of mathematics as possible, not tied to any specific curriculum; and an emphasis on giving people the experience of the "Aha!" moment of discovery.

You also run mathematical walking tours in Manhattan. What do those involve?

I talk about the algorithms used to control traffic lights, the mathematical issues involved in keeping the subway running, the symmetry of the mouldings on the sides of buildings and the unusual geometry that gives ginkgo trees their distinctive shape. There are deep connections to music, art and finance. If you give me a route, I'll make a tour. There is maths everywhere.

INTERVIEW BY JASCHA HOFFMAN