Marcus du Sautoy on... **the importance of the history of maths**

"History can be a powerful ally in teaching difficult mathematical ideas for the first time"

When I learnt my mathematics at school it was taught in a very ahistorical manner. The people, the cultures, the politics were all missing. It was the ideas that counted. I learnt how negative numbers worked. What to do with a sine and a cosine. How to calculate volumes of solids. I knew little of the history of these ideas. Personally, the abstract ideas were enough to excite me, but the missing stories of where these ideas came from could have engaged so many more in the wonders of mathematics.

For example, sines and cosines were our best tools for navigating the night sky centuries before Galileo ever had a telescope in his hands. The ancient Greeks could use triangles and angles to tell the relative sizes of the earth, moon and sun without ever leaving the comfort of their observatories. I think that knowing this history gives life to concepts that might otherwise feel like they're invented to torture students at exam time.

Or take the formula for the volume of a pyramid. You could simply learn that it's a third the area of the base times the height. Or you could show students the Egyptian papyrus where this formula first appears. The scribe was motivated by the very practical challenge of wanting to know how many stones the architects would need to build the pyramids in Giza. The papyrus also contains the ideas of how to derive the formula by approximating a pyramid by constructing a tower of rectangular boxes. Suddenly, with context, a dry equation comes alive.

I must admit that it was only when I started exploring ways to bring mathematics to the masses through the books I have written and the TV programmes that I have made that I myself became aware of where my subject came from. In 2008 I made a series for the BBC called *The Story of Maths*. It charted in four one-hour episodes the origins of mathematics in ancient Egypt and Babylon, through to the amazing breakthroughs of the last century that are the ingredients for the technological revolution we all enjoy today.

It was while making that programme that I understood how Eurocentric our view of mathematics is. The story most people are fed is that mathematics began with the ancient Greeks and then went quiet until its resurgence during the Renaissance. But I discovered how much exciting mathematics was being done in India long before Fibonacci (c1175–c1250) kickstarted the mathematical revolution in Europe, and that there were inklings of the calculus bubbling away in India in the 14th century, well before Newton and Leibniz articulated their theory. But these historical vignettes aren't just interesting curiosities.

Witnessing the way teachers have used excerpts from the *Story of Maths* in the classroom, I've seen how history can be a powerful ally in teaching difficult mathematical ideas to those encountering them for the first time. A historical perspective has even helped me in my own journey to create new mathematical knowledge – appreciating how a completely new mathematics appeared from the old has given me the tools to make my own breakthroughs.

A historical narrative is actually hiding beneath the educational trajectory we take students on as they learn their mathematics. It's not dissimilar to building those pyramids in Giza. Each year at school we construct a new layer of the edifice on top of the ideas we encountered before. And this is exactly how mathematics evolved through history. What distinguishes mathematics from the rest of science is that the mathematics that was discovered 2,000 years ago is as true today as it was when the likes of Euclid recorded the ideas in his *Elements*. The resilience of mathematics to the effects of time is due to the power of proof. Mathematical proof allows us to access truth in a manner that is almost impossible in any other subject.

The other important role that history can play for my subject is to reveal that it is still a living, breathing subject. For most students, mathematics seems to live in some timeless, never-changing textbook that has been handed down from generation to generation. With such a picture, it's no wonder that many don't realise that there are still so many chapters of the mathematical story still to be written. But what gets me up in the morning to run to my desk are all the unsolved problems. It's the mathematical enigmas – those whose solutions will become the stories of tomorrow – that are the lifeblood of mathematics. H

Marcus du Sautoy is the Simonyi Professor for the Public Understanding of Science, professor of mathematics at the University of Oxford and the author of *What We Cannot Know* (Fourth Estate, 2017).

OXFORD UNIVERSITY IMAGES/JOBY SESSIONS