



Maths in the media

First the Fields Medal, now South Australian of the Year

Congratulations to Terence Tao for being awarded the honour of South Australia's Australian of the Year for 2007. Tao's award follows his win of the Fields Medal at the International Congress of Mathematics last year (you can read the *Gazette* online supplement dedicated to his win at <http://www.austms.org.au/Publ/Gazette/2006/Jul06/Supplement/>). This Australian recognition of Tao's mathematical achievements sits alongside those of other Australian of the Year finalists; such as Tim Flannery's (awarded Australian of the Year) climate change campaigning and research, and Barry Marshall's and Robin Warren's Nobel winning research on gastric ulcers.

Science Magazine's breakthrough of the year: The Poincaré Theorem

In 2006, researchers closed a major chapter in mathematics, reaching a consensus that the elusive Poincaré Conjecture, which deals with abstract shapes in three-dimensional space, had finally been solved. Science Magazine saluted this development as the Breakthrough of the Year in their final issue of 2006, along with nine other of the years most significant scientific accomplishments.

The Poincaré Conjecture, from topology, was proposed in 1904 by Henri Poincaré. It describes a test for showing that a space is equivalent to a 'hypersphere', the three-dimensional surface of a four-dimensional ball. A century later, researchers were still trying to prove the conjecture. In 2000, the Clay Mathematics Institute named the Poincaré Conjecture as one of its million-dollar 'Millennium Prize' problems.

In 2002, Russian mathematician Grigori Perelman, who had been working mostly incommunicado for seven years, posted on the Internet the first of three papers that outlined a proof of Poincaré's conjecture as part of an even more ambitious result.

The work set experts abuzz. Though there were still many gaps to be filled in, it looked as if Perelman had scored a historic coup. But, after a visit to the United States in 2003, the reclusive mathematician returned to Russia and stopped replying to phone calls and emails. Other mathematicians were left on their own to determine whether Perelman had truly solved the Poincaré Conjecture.

By 2006, the others finally caught up. Three separate teams wrote papers that filled in key missing details of Perelman's proof, and there was little doubt among his colleagues that he had solved the famous problem. This summer, the International mathematics Union decided to award Perelman the Fields Medal, the 'Nobel prize of mathematics', though Perelman declined the award.

Unfortunately, the year has ended on a note of discord, with claims of plagiarism by some of the researchers who worked on the follow-up papers to Perelman's proof, and other mathematicians crying foul over how they were quoted in a prominent New Yorker article. Still, other researchers are ready to celebrate this landmark achievement in their field.

Science's list of the Top Ten Breakthroughs of 2006 appeared in the journal's 22 December 2006 issue (<http://www.sciencemag.org/sciext/btoy2006/>).



The front cover of the 'Breakthrough of the Year' issue of *Science* featuring an image by Cameron Slayden, based on data provided by Robert Sinclair, illustrating Perelman's approach. To prove the Poincaré Conjecture, Grigori Perelman used the equations for Ricci flow — a procedure for transforming irregular spaces into uniform ones. In this two-dimensional example, the equations prescribe that negatively curved regions must expand while positively curved regions contract. Over time, the original dumbbell-shaped surface evolves into a sphere. (Image courtesy *Science*.)