Parabola Volume 44, Issue 1 (2008)

Dear Readers

Welcome to this first issue for 2008. I hope you enjoy the articles and problems. The articles by Michael Deakin and Peter Brown in this issue both relate to proof: Dedkind's proof that there are an infinite number of objects and the proof by mathematical induction. Bill McLean's article introduces a freely available software package that you can download for doing algebra and calculus. Thanh Tran has a new set of problems for you to attempt. If you solve any of these problems please let us know so that we can try to include your solutions in the next issue.

Since it is the start of a new year, more or less, I thought it might be interesting to reflect on the greatest mathematical discovery of the past few years. This is tricky and sure to cause debate among mathematical colleagues. Occasionally some discoveries are so great that there is no debate; Grigori Perelman's proof of the Poincaré Conjecture in 2002, 2003 and Andrew Wiles proof of Fermat's Last Theorem in 1994, 1995 being cases in point. Indeed these discoveries were so lauded that they received major coverage in the popular media. But many other important mathematical discoveries do not reach the popular media. Part of the reason for this is that we (mathematical researchers) are not good at communicating mathematical research to non-mathematicians. Even in the case of Perelman's proof and Wiles' proof the reporting was really a human interest story – mathematicians solved a problem that had been unsolved for a long time.

My choice for the greastest mathematical discovery of the past few years is Darren Crowdy's extension of the Schwarz-Christoffel formula. The Schwartz-Christoffel formula, which was originally introduced in the 1860s, can be used to transform a polygon into a circle in such a special way that intersecting lines drawn across the faces of the polygon are transformed into intersecting lines that cross the circle with the same angle between the intersecting lines before and after the transformation. This type of transformation is called a conformal mapping. The usefulness of such a transformation is that it enables calculations to be carried out in the simpler circular geometry which can then be transformed back to the irregular polygonal geometry. There have been numerous applications in physics, engineering and biology but a major limitation of the transformation has been that it could not accommodate polygons with more than one interior polygonal hole. Crowdy's extension has overcome this by providing a conformal mapping of the interior of a polygon with polygonal holes to the interior of a circle with circular holes. As an interesting aside, the basic strategy that Crowdy used to extend the Schwarz-Christoffel formula was the use of a formula for Schottky groups that Crowdy first learned when he attended the 2003 International Council for Industrial and Applied Mathematics Congress held in Sydney in that year.

There are many internet sites that highlight major mathematical discoveries that may not make it to the nightly television news. It's well worthwhile visiting these sites from time to time. A few that I recommend are:

http://www.sciencedaily.com/news/computers_math/

http://www.maa.org/mathdl/minarchive.html[1] bb
http://plus.maths.org/
http://www.ams.org/mathmedia/
http://www.eurekalert.org/bysubject/mathematics.php

B.I. Henry
Editor

[1] Editorial note, February 2014, this is now a dead link