Mathematics Enrichment Activity:
The Shape of Space

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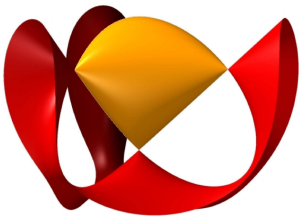
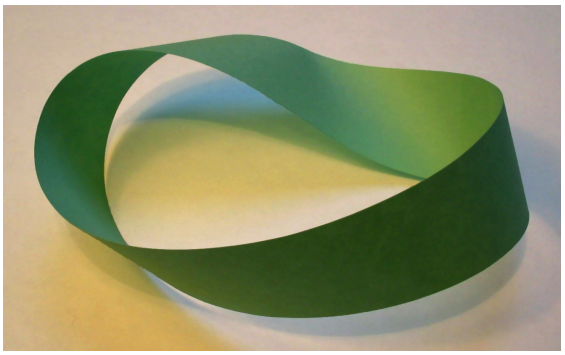


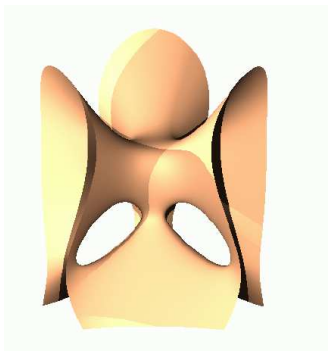
In mathematics and science, we often need to think about high (3 or more) dimensional objects, called *spaces*, which are hard or impossible to visualize. Besides the question of what such objects are or could be, is the problem of how can we make sense of such spaces.

The goal of this activity is to give you an idea of how mathematicians manage to make sense of higher-dimensional spaces, and relate this to the recent proof of the Poincaré conjecture that won the Millenium Prize of the Clay Institute. We will do this by exploring the simplest spaces, and through our explorations, we will begin to see how we may tell different spaces apart.

Besides bringing your enquiring minds, at least 50% of the attendees need to bring a belt for those articles will play a key role in our discussion. We will also dissect donuts and make Möbius bands. Spectators (parents, older siblings) are welcome.

This activity is an example of a *Math Circle*, which is a nation-wide movement bringing mathematics professionals into direct contact with pre-college students.





Frank Sottile is a professor of Mathematics at Texas A&M University, who is known for his outreach work. He organizes the Texas A&M Math Circle, a weekly program of mathematical enrichment and exploration for middle school students in College Station, Texas, and is in Hilo assisting a program for mathematics undergraduates, PURE Math. He has presented this activity *The Shape of Space* to many groups in Texas, Georgia, California, Nigeria, and now, Hawaii.