Applications And Non Euclidean Geometry
by Adi Cox 29th April 2013

A curious thing is that the area of a circle with radius one has an area of pi. Is this true if a circle is measured by a unit larger than a galaxy, or some tiny quantum unit smaller than an atom, I wonder if space is really that consistantly euclidean.

Non Euclidean geometry is something I was taught at the Open University and this is a subject I very often find myself thinking about. I have often thought about exploring this subject and so here I am writing this small piece.

Geometry is generally considered to be a pure mathematical subject but I argue here that really Eucldean geometry could be seen as a more applied mathematics because it replicates the space we live in around us. Whereas Non Euclidean geometry is a litte more exotic.

Although non Euclidean geometry is easy to find applications for finding the areas of curved surfaces like second order quadrics in a real three dimentional space with equations like the following:

$$Ax^2 + By^2 + Cz^2 + Dxy + Exz + Fyz + Gx + Hy + Iz + J = 0$$

This world we live in is very much three dimensional. Is there anything that is not three dimensional in the real world? Even shadows are projections onto uneven surfaces with three dimensional irregularity. The truth is that a two dimensional non Euclidean area needs three coordinates.

So my final point here is that to take non Euclidean geometry up another dimension we will be out of this physical space because we shall require third order quadrics in a four dimensional space with equations like the following:

$$Aw^3 + Bx^3 + Cy^3 + Dz^3 + Ewxy + Fwxz + Gwyz + Hxyz + Iw^2 + Jx^2 + Ky^2 + Lz^2 + Mwx + Nwy + Owz + Pxy + Qxz + Ryz + Sw + Tx + Uy + Vz + W = 0$$

Three dimensional Geometry in a four dimensinal space is more abstract and trully a pure mathematics because it takes us into a mathematical place that is not immediately representative of the physical world around us.