

1014-Z1-1157 **Douglas G. Burkholder*** (BurkholderD@LRC.edu), Box 7274, Lenoir-Rhyne College, Hickory, NC 28603. *Parallelogons and Cutting Elliptical Cakes.*

While the definition of an affine regular polygon is straight forward - any polygon which is the affine image of a regular convex or regular stellar polygon - it is not obvious how to determine whether or not a given polygon is affine regular, nor is it obvious how to easily construct an affine regular polygon without an affine map. In this talk, we produce three generalizations of parallelograms and prove that they are equivalent. These provide a simple technique for constructing and a simple technique for identifying affine regular polygons - both convex and stellar - using a quilter's ruler and a single calculation.

We then use the quilter's ruler, and occasional calculations, to cut elliptical cakes equally, even after someone has made the first cut. If someone has cut, but not removed, one or more pieces from the elliptical cake, we can determine whether or not they are $1/n^{th}$ of the cake. Since a photograph of a round cake will look elliptical, we can also analyze photographs of round cakes to determine whether or not the pieces are $1/n^{th}$ of the cake. (Received September 27, 2005)