

# Cal Poly Pomona, Mathematics Ed Colloquium

## Visualizing Symmetry: The Art and Mathematics of Symmetry Groups

by

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*Both mathematicians and artists employ the concept of symmetry. In mathematics, the study of symmetry groups plays a central roll in both algebra and geometry. Finite symmetry groups, in particular, include two- and three-dimensional point groups. The two-dimensional point groups are the familiar cyclic and dihedral groups. In three dimensions, the point groups fall into two categories. First are the prismatic groups and their subgroups, and second are the groups and subgroups of symmetries of regular solids, including the tetrahedral, the cube-octahedral, and the icosahedral groups. Infinite symmetry groups include the frieze and wallpaper groups. In art, like in geometry, objects having these symmetry groups are aesthetically intriguing. As an artist, I will present artistic representations of objects that embody these symmetry groups, showing both my own work and the work of my students. As a mathematician, I will prove that certain types of symmetry groups can only be so complicated. In particular, cyclic  $C_n$  symmetry (for  $n = 5, 7, 8, 9, \dots$ ) cannot appear in the wallpaper groups, and for  $n > 5$ ,  $C_n$  symmetry cannot appear in three-dimensional point groups that are not prismatic groups.*

**This talk takes place January 17, 2007 from 10:30-11:15 in Building 4, Room 48.**