Q: How much Math is in Art?

For centuries, mathematical concepts such as symmetry, proportion, and perspective have been inherent in the creative work of people all over the world. Folk art, often created for practical or ceremonial use, continues to represent cultural traditions, history and perspectives. Handmade clothing, baskets, pottery, and jewelry frequently display geometric forms. Some examples include:

* the golden ratio and rectangle
* African patterns and graphs
* fascinating fractals
* Navajo and pueblo symmetry
* mathematics of architectural design and engineering

Escher was one artist that was particularly influenced by math. In fact, some of Escher's greatest admirers were mathematicians, who recognized in his work an extraordinary visualization of mathematical principles. He often drew great inspiration from the mathematical ideas he read about, working directly from structures in plane and projective geometry. Escher was especially fascinated with paradox and "impossible" figures. His work encompasses two broad areas: the geometry of space, and what we may call logic of space.

Specifically, Escher used

**POLYHEDRA** Escher used the regular solids, known as polyhedra, in much of his work. If it was not the main focus, it was included as a secondary object. He even would intersect the solids in ways that their symmetries were aligned or place chameleons inside the polyhedra to "jar us out of our comfortable perceptual habits and challenge us to look with fresh eyes upon the things he has wrought."

**TESSELLATIONS** Escher was fascinated by every kind of tessellation - regular or irregular - and took great delight in what he called "metamorphoses" in which shapes changed and interacted with each other, and sometimes broke free of the plane itself. He applied what geometers would call reflections, glide reflections, translations, and rotations in his tessellations to obtain a greater variety of patterns.

**THE SHAPE OF SPACE** Among the most important of Escher's works from a mathematical point of view are those dealing with the nature of space itself. His woodcut three intersecting planes is a good place to begin a review of these works, for it exemplifies the artist's concern with the dimensionality of space, an with the mind's ability to discern three-dimensionality in a two dimensional representation.

**THE LOGIC OF SPACE** The logic of space is the spatial relations among physical objects which are necessary, and which when violated result in visual paradoxes, sometimes called optical illusions.

Reference: http://www.mathacademy.com/pr/minitext/escher