Play with Phi and Maybe We'll See: Exploring Connections Between the Golden Ratio and the Unit Circle

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Abstract

The Golden Ratio has been one of the most long lasting answers to the artist's search for the "'perfect' proportion, one that… automatically confer[s] aesthetically pleasing qualities on all works of art" (Livo, 2003, p. 10). This ratio can be applied to the side-to-side ratio of a rectangle; one of these rectangles may be regarded by some as one of the most aesthetically pleasing geometric shapes. The goal of this project was to find the possible connections between several Golden Rectangles inscribed within a unit circle. By taking the inverse tangent of ϕ I was able to calculate the degree on the unit circle of which a point of a golden rectangle would be. Through several reflections I was able to calculate the other three points of the rectangle. After measuring the arc between each of the other points, I was able to find any other Golden Rectangle starting with any other point on the circle. After solving for six Golden Rectangles my results were mostly inconclusive, but several patterns and shapes did emerge. Some shapes were produced inscribed rectangles such as several pentagrams and a dodecagon. Other patterns were recognizable in the coordinates or degree positions of the Golden Rectangles' vertexes. After recording these results I attempted to create Golden Rectangles within a circle with a radius of phi (ϕ). Several more notable patterns between the unit circle and ϕ circle coordinates occurred.