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From Sultaniyeh to Tashkent scrolls: Euclidean constructions of two nine- and twelve-pointed interlocking star polygon designs.

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Summary: In this paper we will explore two nine- and twelvepointed Islamic star polygon patterns consisting of "nearly regular" nine-pointed, regular twelve-pointed and irregularly-shaped pentagonal star polygons. The two designs are similar in that they may both be classified mathematically as being p6m patterns with the major star polygons placed in identical locations within each layout; however, the structure of the major stars is quite different. Both of the patterns considered here are of Persian origin. The first design may be found as a repeat unit sketch of the *Tashkent Scrolls*, and exists as a Timurid-style stone inlay and mosaic tiling in India. The second pattern may be found as Plate 120 of Bourgoin's *Arabic Geometrical Pattern and Design* and exists as a stucco/plasterwork ceiling in the Mausoleum of Sultan Oljaytu in Sultaniyeh, Iran, as well as numerous other locations across the Islamic world. Both patterns may be recreated via plausible Euclidean "point-joining" constructions (that is, using only the methods available to medieval artisans) in an attempt to ascertain how the original designers of these patterns may have determined the proportion and placement of the stars.

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