

SAW Three-Month Workshop:

Mathematical Practices in relation to the Astral Sciences

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Reasonings in the Goladīpikā of Parameśvara

Abstract: Calculating the "Great gnomon" (the height of the sun, or the distance between the horizontal plane and the sun on the celestial sphere) is one of the central subjects in the treatises on spherical astronomy by Parameśvara (c.1360-1460). He composed two treatises of different structure under the same title Goladīpikā, both of which contain working examples or exercises related to the Great gnomon.

I focus on one exercise where the reader is asked to calculate the Great gnomon of the sun in a corner direction (45 degrees inbetween the cardinal directions) for a given longitude of the sun and terrestrial latitude. I have identified more than 10 steps in the procedure, explained in the section of the treatise before the exercise, and most of which are either the Pythagorean Theorem (using right triangles) or the Rule of Three (using similar triangles). In other words, what is being done is (1) finding a right triangle related to a specific segment, (2) finding another triangle similar to this one and (3) obtaining the length of a new segment with the Rule of Three and going back to the first step. What are the reasonings for connecting segments to make triangles? What are the reasonings for linking one triangle to another one? Armillary spheres seem to have been behind these justifications.