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localities, and for southern localities, at a distance of 18 degrees in the counter-sequence, also from the head. Considering this, the solar eclipse limit will be 36 degrees, and for two successive conjunctions a solar eclipse is possible but on two [different] sides of the world, i.e., north and south; in one location, however, it is not possible.

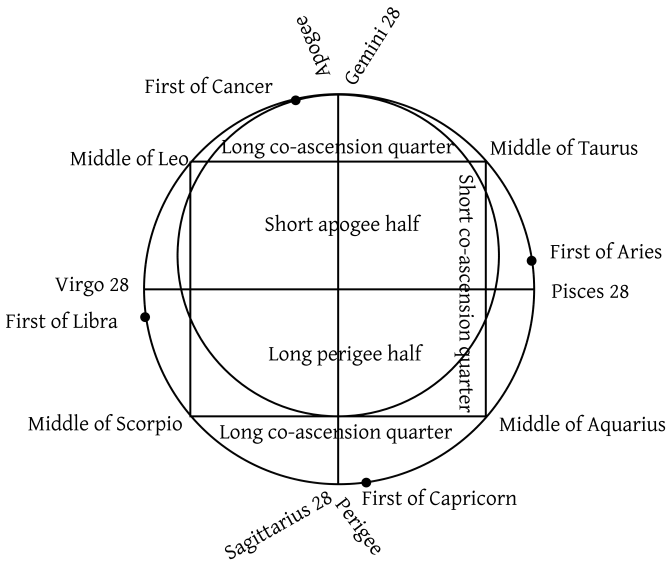
[13] This is an explanation of this matter as appropriate for this place. These values that we gave in the examples, if divergent from true ones, should be excused, inasmuch as this is not the place for correcting practical [values/calculations]. For providing an account of the configuration (*hayʾat*), this is of sufficient extent.

Section [Eight]
On Conceptualizing the Equation of Time

[1] In the Ninth Chapter of Book III, it has been stated that the difference between mean days and true days, which is expressed as the equation of time, is composed of two differences. One of these is due to fastness and slowness of the Sun on account of its uniform motion about the center of the eccentric and the consequent irregularity about the center of the World. Its greatest extent amounts to twice the maximum equation. In the apogean half, i.e., in the half of the revolution in which the apogee is at the midpoint of that half, the true days will be shorter than the mean ones because of the slower speed, while in the other half they will be longer. The second [difference] is what occurs due to the difference between degrees of the zodiacal orb and the parts on the equinoctial upon the transit of the meridian circle, or[1] rising for horizons of the equator. The maximum of this difference is 5 degrees. In the two quarters in which the two equinox points are the midpoints, i.e., from the midpoint of Aquarius to the middle of Taurus

1. Reading *yā* instead of *bā*.

and from the middle of Leo to the middle of Scorpio, the true days are shorter than the mean days; in the other two quarters longer. So, in order to combine these two differences with one another, a figure has been drawn so that it becomes clear where the two causes of shortening [the days] come together, where the two causes of lengthening [the days come together], and where these two causes are in opposition to one another. This is the figure:



[Figure 1]

[2] According to this figure, the Sun's circuit has become divided into six parts, which are governed differently. The first part is from the midpoint of Aquarius up to Pisces 28°, approximately 43 degrees. Its days, with regard to being in the perigean half, will be long, but with regard to co-ascensions short. The second part is from Pisces 28° up to the midpoint of Taurus, approximately 47 degrees. Its days, with respect to both factors, are short. The third part, a full quarter revolution, is from the midpoint of Taurus to the midpoint of Leo. Its days, with regard to [the Sun] being in the apogean half are short, but long with regard to co-ascensions. The fourth part is from the mid-

point of Leo to Virgo 28°, approximately 43 degrees. Its days, from both points of view, are short. The fifth part is from Virgo 28° to the midpoint of Scorpio, 47 degrees. Its days are short perigean-wise, long co-ascension-wise. The sixth part is from the midpoint of Scorpio to the midpoint of Aquarius, one full quarter. Its days, from both points of view, are long. In no place have these two causes come together more than in this quarter. For this reason, it is best to make the beginning part or ending part of this quarter the starting point, so the difference will always be additive or subtractive. If the starting point is taken to be at the beginning part of [this] quarter, the true [days] will always be in excess of the mean [days]. If the starting point is taken to be at the ending part of [this] quarter, the mean [days] will always be in excess of the true [days]. This becomes quite clear in practice.

Section [Nine]
On Depicting the Indian Circle, the Azimuth of Cities, and Other Matters

[1] In Chapter Twelve of Book III, two methods have been presented to determine the meridian line. One is the Indian circle whose illustration is thus: