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retrogradation and direct motion.

[5] Since all the planets combust at the apex, the Sun overtakes the upper planets after combust; therefore, they rise before the Sun does. They are then called oriental [to the Sun] until there are 60 degrees between them and the Sun. When they reach near the Sun's trine, they become stationary. Then they retrograde, and, at the midpoint of retrogradation, which occurs at perigee, they will be in opposition to the Sun. After that, near the second trine, they become stationary, and then they move directly. When there is less than 60 degrees between them and the Sun, they set after the Sun and are occidental [to the Sun] until they reach the Sun at apex.

[6] When Venus and Mercury pass the apex, they precede the Sun and therefore set after it does. They are then called occidental [to the Sun] until they reach *ribāṭ-i aʿẓam*, which is the maximum distance, and there their speed is slower. Thereafter they retrograde, and at the midpoint of retrogradation they reach the Sun. This is the second combust, which occurs at perigee. When they pass beyond, they will rise before the Sun and become oriental [to the Sun] and again move directly. When they reach the maximum distance, their speed increases until the initial state of affairs is reached. In one half of their cycle they are occidental [to the Sun], and in the other half they are oriental [to the Sun], [the halves being] opposite to those of the upper planets—God is all-knowing of the Truth.

CHAPTER ELEVEN

An Exposition of Parallax of the Lower Planets

[1] Since the positions of the planets on the zodiacal orb are determined by the line that passes from the center of the World through the center of the body of the planet and reaches the surface of the sphere of the zodiacal orb, the line that reaches the planet and the

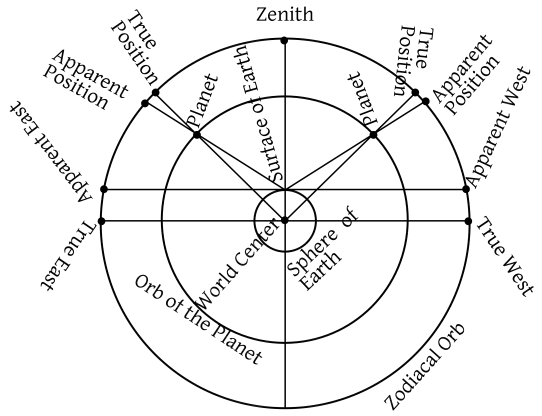
surface of the zodiacal orb from the viewpoint of an observer on the surface of the Earth will no doubt differ from the former line. The difference between these two lines is due to the radius of the Earth, and the closer a planet is to the Earth the greater this difference appears. Thus, a planet's position with respect to the center of the World is the planet's true position, while the position of the planet with respect to the surface of the Earth is its apparent position. In all cases the apparent position is closer to the horizon than the true position, because the line extending from the surface [of the Earth] falls below the line [extending] from the center as it passes through the planet. In all cases, if a plane that divides the orb into two halves, one visible and the other invisible, is tangent to the visible surface of the Earth, the visible half will be smaller than the invisible half. This is because this plane is parallel to the plane that divides the orb into two [equal] halves and passes through the center with respect to the Earth's radius. This difference [i.e., parallax] is perceptible in the orbs up to the orb of Mars, but in Mars's orb it is not perceptible because in relation to Mars's circuit the Earth is like a point, and the visible half is equal to the invisible half. This difference is greatest in the Moon, which is the nearest of all the [celestial] bodies [to the Earth].

[2] Parallax on an altitude circle is then an arc on the altitude circle between the endpoint of the line of center and the endpoint of the line of sight on the surface of the zodiacal orb.

[3] In loci where the equator of the zodiacal orb passes through the zenith, and the planet is on the [zodiacal] equator, and the [zodiacal] equator coincides with the altitude circle, the parallax in the altitude circle is longitudinal parallax only, with no latitudinal parallax. When [both] the pole of the zodiacal orb and the planet are on the meridian, the meridian circle is [both] the altitude circle and the latitude circle; in this case, the planet has parallax in latitude but no parallax in longitude. Likewise, when the planet's altitude circle passes through the

two poles of the zodiacal orb, which happens when the planet is at the midpoint between ascendant and descendant. If the planet is at mid-heaven at the zenith point, then there will be no parallax, neither in longitude nor in latitude. In all other positions, the parallax will be a combination of the longitude and latitude [components].

[4] The maximum parallax of the Moon is about $1+\frac{1}{2}+\frac{1}{4}$ ° when it is at the nearest distance, and 54 when it is at the farthest distance. During a lunar eclipse, it is never more than 1°;4′. The maximum solar parallax is 3′ when the Sun is at the nearest distance and bordering on one minute when it is at the farthest distance. Here follows an illustration of parallax—and God is all-knowing:



[Figure 1]

CHAPTER TWELVE

On the Reason for the Increase and Decrease in the Moon's Light

[1] The body of the Moon is a spherical body that is thick and smooth but not, in actuality, luminous. Every body that is thick and smooth, when facing a luminous body, will be illuminated by the rays [of that luminous body], and, like mirrors, water, etc., reflect those rays onto things facing it. Likewise, the Moon is illuminated by facing the Sun