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The Orbit of Earth

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In our solar system, the Earth's orbital plane is known as the ecliptic plane. The perihelion and aphelion distances, which are the closest and the farthest points from the Sun are said to be lie on the ecliptic plane. The distance between the Earth and Sun is not same throughout the year, i.e. the orbit of Earth deviates a bit from the circle. However, the difference between perihelion and aphelion distance is very small. The goal of our research was to see if changing the shapes or inclination of the earth's orbital plane makes any difference in: the axial tilt of Earth and Sun, the time period taken for the Sun to move from vernal equinox to autumnal equinox, and then back to the vernal equinox. For this we constructed a 3-D numerical model of the Earth-Sun geometry. Our model defines Earth's orbit as an inclined plane of the spherically symmetric system. We calculated the degree of the tilt of earth orbit to the ecliptic plane by converting from ecliptic frame of reference to orbital frame of reference and then we made measurements. Initial inputs for our model are aphelion and perihelion parameters. It is interesting to examine that the results obtained from the earth inclined orbit is same that of earths circular orbit. In other words, the axial tilt of Earth and Sun, the time period taken for the Sun to move from vernal equinox to autumnal equinox, and then back to the vernal equinox does not changes. Moreover, we were also able to derived mathematical relations for finding the length of the apparent solar days throughout the year. Our mathematical relation provides new insight for the calculation of the time period for the revolution of Sun around the Galactic center.