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Kepler’s Law Lab: Lunar Modeling

Purpose: The observations, which consist of the direction of view, weather conditions, lunar phase, and measured diameter of the moon at a given time, are made in order to model the orbit of the moon. Through these observations, modelers should be able to prove that the moon has an elliptical orbit, as stated for all planets by Kepler’s First Law.

Observation Site: My lunar measurements were taken across the street from my house, up a grassy incline. Here, the moon could be observed without the interference of trees which often blocked my view from my backyard. The terrain there is fairly level and allows for a wide range of movement. The equipment that was used was a telescope with an eyepiece equipped with a measuring scale in units of mm. The scale read from 0 to 50 mm and could be adjusted in brightness while viewing the night sky. The scale could also be rotated to ease measuring, especially if measuring a crescent moon from horn to horn.

Observations: The data recorded, the measured diameter of the moon, was used to calculate the distance of the moon from the earth. It was then graphed to discover the rough shape of the orbit. As my model was created, it became evident that the eccentricity of the moon’s orbit is very small. Because of this, it appears largely circular, although it has a small eccentricity. For the most part, a best fit curve could be approximated easily by using the data points observed by the class as a whole although there were some measurements that seemed a little low or high based on the best fit curve.

Conclusions: Kepler’s First Law can be proven through the data; the moon has an elliptical orbit which has a very small eccentricity. The observations made by the class as well as the models produced support this conclusion.