

Kepler's Laws of Planetary Motion [msl22]

1. **Law of orbits:** Planets move in elliptical orbits with the sun at one focus.
2. **Law of areas:** The position vector of any planet relative to the sun sweeps out equal areas in equal times.
3. **Law of periods:** The square of the period of revolution of any planet is proportional to the cube of the semi-major axis of the planet.

These laws were formulated between 1609 and 1619 on an empirical basis, decades before the discovery of the law of gravity.

The *first law* follows from the orbital integral of the general central force problem applied to the inverse square force law.

The *second law* is a consequence of the conservation of angular momentum and is valid for all orbits of any central force problem.

The *third law* follows from the relation between the angular momentum and the area swept out by the position vector of the planet during one period of revolution.

