

CHAPTER OVERVIEW

9: The Two Body Problem in Two Dimensions

In this chapter we show how Kepler's laws can be derived from Newton's laws of motion and gravitation, and conservation of angular momentum, and we derive formulas for the energy and angular momentum in an orbit. We show also how to calculate the position of a planet in its orbit as a function of time. It would be foolish to embark upon this chapter without familiarity with much of the material covered in Chapter 2. The discussion here is limited to two dimensions. The corresponding problem in three dimensions, and how to calculate an ephemeris of a planet or comet in the sky, will be treated in Chapter 10.

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[9.2: Kepler's Second Law from Conservation of Angular Momentum](#)

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Thumbnail: Two bodies with similar mass orbiting a common barycenter external to both bodies, with elliptic orbits—typical of binary stars. (Public Domain, Zhatt).

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