

3.1: Introduction

It is assumed in this chapter that readers are familiar with the usual elementary formulas encountered in introductory trigonometry. We start the chapter with a brief review of the solution of a plane triangle. While most of this will be familiar to readers, it is suggested that it be not skipped over entirely, because the examples in it contain some cautionary notes concerning hidden pitfalls.

This is followed by a quick review of spherical coordinates and direction cosines in three-dimensional geometry. The formulas for the velocity and acceleration components in two dimensional polar coordinates and three-dimensional spherical coordinates are developed in section 3.4.

Section 3.5 deals with the trigonometric formulas for solving spherical triangles. This is a fairly long section, and it will be essential reading for those who are contemplating making a start on celestial mechanics.

Sections 3.6 and 3.7 deal with the rotation of axes in two and three dimensions, including Eulerian angles and the rotation matrix of direction cosines.

Finally, in section 3.8, a number of commonly encountered trigonometric formulas are gathered for reference.

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