Chapter 2

StrAIGHTNESS ON SPHERES

[I]t will readily be seen how much space lies between the two places themselves on the circumference of the large circle which is drawn through them around the earth. ... [W]e grant that it has been demonstrated by mathematics that the surface of the land and water is in its entirety a sphere, ... and that any plane which passes through the center makes at its surface, that is, at the surface of the earth and of the sky, great circles, and that the angles of the planes, which angles are at the center, cut the circumferences of the circles which they intercept proportionately, ...

— Ptolemy, Geographia (ca. 150 A.D.) Book One, Chapter II

This chapter asks you to investigate the notion of straightness on a sphere, drawing on the understandings about straightness you developed in Problem 1.1.

Early History of Spherical Geometry

Observations of heavenly bodies were carried out in ancient Egypt and Babylon, mainly for astrological purposes and for making a calendar, which was important for organizing society. Claudius Ptolemy (c. 100–178), in his Almagest, cites Babylonian observations of eclipses and stars dating back to the 8th century B.C. The Babylonians originated the notion of dividing a circle into 360 degrees — speculations as to why 360 include that it