

Chapter 6

TRIANGLES AND CONGRUENCIES



Polygons are those figures whose boundaries are made of straight lines: **triangles** being those contained by three, ...

Things which coincide with one another are equal to one another.

— Euclid, Elements, Definition 19 & Common Notion 4

At this point, you should be thinking intrinsically about the surfaces of spheres, cylinders, cones, and hyperbolic planes. In the problems to come you will have opportunities to apply your intrinsic thinking when you make your own definitions for triangle on these surfaces and investigate congruence properties of triangles.

In this chapter we will begin our study of triangles and their congruencies on all the surfaces that you have studied: plane, spheres, cones, cylinders, and hyperbolic spaces. (If you skipped any of these surfaces, you should find that this and the succeeding chapters will still make sense, but you will want to limit your investigations to triangles on the surfaces you studied.)

Before starting with triangles, we must first discuss a little more general information about geodesics.