In Chapter 8, you were able to create a nice MapKit app with no coding on your part; Xcode did it all for you. That app allowed you to scroll around the world map, zoom in to view more details, and zoom out as well. For all the wonderful technology packed into it, though, your simple app was not very useful beyond perusing the map. In this chapter, you’re going to create something that has a bit more usefulness and functionality to it. You’re going to consider a variety of components that you’ll use to build in to your app.

For this project, programmers like you need to spend a minute recalling some basic earth science and geography so that your code will be as effective as possible. After you’ve gained sufficient understanding about the geo coordinate system built into MapKit, you can create wonderfully imaginative, fun, and useful map-based applications for the masses.

The central piece of any MapKit-based app is the `MKMapView` class. This complex class provides the core map functionality required so that you, the programmer, can provide users of your app the ability to visualize an abstract view of their world. A Map View contains a flattened representation of a spherical object—Earth in this case.

You need to understand a couple basic ideas about how to specify coordinates in a Map View and how these coordinates ultimately translate to points on the surface of the Earth. This understanding is especially vital if you plan to place custom content on the top of the Map View.

The good news is that you’re not required to know more than a few basic concepts, along with some elementary math, to get started. MapKit provides most, if not all, of the functionality you will need to compute geo points and locations related to the Map View.

**Understanding Map Geometry and Coordinate Systems**

For this app, one of the things you’ll do is direct the iPad to animate a pin dropping down onto the map. Your annotation is dropped onto a specific location, giving *longitude* and *latitude*, but before we proceed, you need to know what these terms really mean. Figure 9-1 shows lines of latitude and longitude.
Lines of latitude, often called parallels, are the imaginary lines that circle the globe horizontally, running east and west. These invisible lines are measured in degrees, minutes, and seconds, north or south of the equator. The equator is the elliptical locus of points on the Earth’s surface midway between the poles, which physically are real points, defined by the Earth’s rotation on its axis. The north pole is 90 degrees north latitude; the south pole is 90 degrees south latitude.

Lines of longitude, often called meridians, are imaginary vertical lines (ellipses) that cross through the north and south poles. They’re also measured in degrees, minutes, and seconds, east or west of the prime meridian, an arbitrary standard that runs through Greenwich, England. Unlike the equator, which goes all the way around the world—360 degrees—the prime meridian (0 degrees longitude) is a semicircle (semi-ellipse), extending from the north pole to the south pole; the other half of the arc is called the international date line, defined as 180 degrees east and/or 180 degrees west longitude.

To understand the coordinate systems used in MapKit, it helps to understand how the three-dimensional surface of the Earth is translated into a two-dimensional map. Figure 9-2 demonstrates how a projection of the Earth’s three-dimensional surface can be flattened into a two-dimensional surface.