Introduction to Topographic Maps

How do we display the height of mountains, the depths of river valleys, and the three-dimensional surface of the world using a map? One method is through topographic maps (also known as contour maps), which are two-dimensional representations of portions of the three-dimensional surface of the earth. **Topography** is the shape and structure of the land surface, and topographic maps help represent that complex land surface on a map depiction. Topographic maps are important tools for geologists, hikers, and the military, to name a few groups, because they show the configuration of the earth's surface as a display that can be read and used like any other map. Cartographers who design these maps solve the problem of representing a three-dimensional land surface on a flat piece of paper by using **contour lines** to which can be interpreted as elevations, gradations, slopes, and height/depth. As with most regular maps you use, topographic maps are shown as an aerial view of the terrain they depict.

Topographic maps are used for many purposes, including 1) to locate yourself in your environment by matching the terrain features around you to what you see on the map; and 2) to visually represent terrain allowing individuals to make inferences about the underlying geologic processes that might have occurred to make the terrain that way. Experts have a lot of practice using topographic maps in real environments that have complex terrain features; but the rules that apply to very simple maps also apply to complex ones.

There are a few things you need to know about topographic maps before you are able to interpret them. First, each contour line represents one specific elevation. If you were to walk along a contour line in an environment, your elevation would not change. Second, moving from one line to an adjacent line changes your elevation by the same amount every time. That change in elevation is called the **contour interval**, and it's the same within each map whenever you

move from one line to an adjacent one. If you were to walk from one contour line to the next in an environment, you would be walking uphill or downhill. Look at the picture below and try to understand how contour maps are constructed, and why these two rules apply. You will notice on some maps that each contour line has a number; that number labels the elevation of that contour line, and hence, its elevations on the surface that the map represents. These numbers are useful for determining whether adjacent contour lines convey elevation increases or decreases. Sometimes the numbers are not on contour maps. In those cases, you have to decide whether the terrain rises or falls.