Astronomy 101U Skylab #5 – "Where did I put that chart?!"

Introduction: Contrary to popular opinion, the sun does not always rise and set at the same spot on the horizon, and there are in fact only two days each year when it rises exactly in the East and sets exactly in the West. For this Skywatch, you will establish these facts for yourself. This lab gives you a great excuse to actually go out and watch some beautiful summer sunrises and sunsets.

Equipment: Your eyes, a compass, a watch and a camera or sketch pad.

Time Required: A few minutes on as many evenings and/or mornings as possible during the quarter. The sooner you start, the more data you'll have.

What to Do: Choose a convenient spot with a reasonably clear horizon. On as many evenings/mornings as possible (at least 10, but 15 is preferable), observe the sunsets/sunrises from the same spot and, with the aid of landmarks on the horizon (mountains whose compass positions must be measured at one time), record the precise position (as well as you can determine it) and time at which the sun sets or rises. Weather may be a problem (especially in the morning), but you will find that you can probably see the sun even through moderately thick clouds.

Make a chart on which all the positions are plotted; each point should be labelled with the data, time of sunset/sunrise, and azimuth (defined as the angle along the horizon from north: North = 0 degrees, East = 90 degrees, South = 180 degrees and West = 270 degrees. A simple chart with the sun's position marked on each date, as well as time of sunset is sufficient. You may show your observations on the sketch that you make of the horizons, or using a telephoto shot of a sunset.

Remember that compass needles point to magnetic north, which is approximately 8 degrees east of true north in the Seattle area.

Questions:

(1) At what date during your observations was the sun furthest north on the horizon? Does this coincide with the latest sunset/earliest sunrise? Explain why we expect it to coincide (a diagram would be helpful).

(2) List at least four sources of error in this experiment. With each, state the approximate size of each error and how it might be reduced or eliminated.

(3) You probably noticed that the sky is always red in the direction of the sunset or sunrise. Why does this happen? Hint: This also explains why the sky is blue.