<u>Object:</u> (1) Appreciate the beauty of the night sky, (2) become acquainted with planetarium software, (3) appreciate distances in space by building a scale model of the solar system, (4) learn how astronomers know what they know.

<u>Theory:</u> People have observed the night sky for millenia. Ancient Greeks, who invented science, made a systematic study of the heavens, observed patterns, and were able to make predictions. Astronomy, as it diverged from the pseudoscience of astrology in the time of Copernicus, Kepler, and Galileo, gave birth to modern science. Kepler gave up a favorite theory because it didn't match the observations. Newton discovered the mathematical principles on which Kepler's laws worked. These principles are the basis of modern science.

<u>Procedure:</u> Comment in your lab write-up on what you learned from each of the following. Most of them can be done outside of the regular lab class time.

1. Attend one night observation with the Astronomy class on a Thursday evening.

2. Play with a planetarium software program for a few minutes. My favorite is Starry Night (used in the Astronomy class and available on the Math Lab computers), but Stellarium and Celestia are available for free download on your own computer. See what the sky looked like the night you were born or look at some important astronomical event in history or in the future.

3. Create a scale model of the solar system, so that the sizes of the sun and planets are on the same scale as the distances between them. Use inexpensive materials. Do this in groups of three or four students, and show your model to the class. How far away is the next nearest star in your scale model?

4. The official class question of the Astronomy class is, "How do we know...?" Find out how we know something in astronomy; for example, find out how we know the temperature of stars, the chemical composition of stars, the distances to stars, the age of stars, or the fate of stars. This does not need to be very time-consuming, but find out how we know something. You may use the on-line labs listed in the accompanying URLs to help you find one of these answers, but don't spend much time on them.

<u>Conclusions:</u>

1. What struck you as awe-inspiring or beautiful?

2. How do software simulations help in astronomy education?

3. Is space crowded?

4. How do astronomers know so much about celestial objects?