Union College Spring 2014

Astronomy 50 Lab 1:

Part A: Earth's Rotation Period

As everyone knows, the day is defined by the time period for the Sun to return to the same position in the sky. Since the movement of the Sun across the sky is actually due to the rotation of the Earth, it is often stated that 24 hours is the period for the Earth's rotation. However, you might be aware that sunrise does not always occur at the same time. There are a number of complicating factors, including the Earth's orbit about the Sun and the tilt of the Earth's axis.

Instructions:

1. At least one hour after sunset, note the precise position of an identifiable star in the sky or on the horizon. For precision, devise some special alignment of objects available to you and a particular place to stand or sit. For example, you might be able to find a bright star that lines up with the top of the Nott memorial when you sit with your back to the flagpole, or you might be able to use the corner of your window when you sit on the end of your bed. Whatever set-up you use, take care to define exactly where you place your eye and that the alignment object you use is not movable. Note the *exact* time and the date that you see that star in that spot.
2. Determine the time that that star is at that exact spot again the next night (if clear). Note: it might not be at the same exact time, so you should get set up at least 10 minutes in advance of the previous time. If there's been more than one day since previous observation, you should allow more time.
3. Determine the time that that star is at that spot ***for at least 3 separate nights***. Note the difference in time from the first day, divide that time difference by the no. of days between the observations to get a good measure of the time difference per day. This is your measured period for the rotation of the Earth.

Part B: Phases and Orbit of the Moon

Most people are aware that the Moon takes about a month to cycle through the phases, as it orbits the Earth. For this part of the lab, you need to follow the Moon's location in the sky and its phase through a complete cycle of phases. NOTE: the Moon is not always up at night-time; there will be days when you need to look for it in the morning or afternoon.

Instructions:

On the first clear evening or early morning that you can see the Moon:

Observations of Phases:

1. note and write down its phase;
2. estimate the fraction of the side that you see that is directly illuminated by the Sun;
3. note which side is illuminated -- the East or West.
4. estimate the angle between the Moon and Sun.
5. note the direction of the Sun from the Moon (is the Sun east or west of the Moon?).

Observations of Moon's Position in Sky:

1. Find the region on the star chart the corresponds to the Moon's current location and identify three bright stars near the Moon.
2. Use your cross-staff to measure the position of the Moon relative to these stars by triangulation. Be sure to measure the distance to the *center* of the Moon.
3. Assign a number to each star you used, and write that number on the chart.
4. Make a data table which includes the date of your observation, the star number, and the distance from each star that you measured the Moon to be.
5. If you have a compass available, on the star chart, draw circular arcs about each star, where the radii of these arcs equals the angular distances of the Moon from these stars. Where these three arcs all intersect (or come closest) is the location of the Moon.

Minimum Observation Requirements:

1. At least one observation of the Moon must be during the day.
2. Your final observation must be at least one full cycle of phases after the initial observation.
3. At least four positions of the Moon relative to the stars, with first and last observations separated by at least four weeks.