

## **Astro 1810: Observing the Apparent Motion and Phases of the Moon**

**Due: November 26th, 2018**

**Turn in to 221 Allen**

For this exercise, you will need to make observations every 2-3 days (or as often as possible, weather permitting) for about 5 weeks. You should have at least 8 observations in about 2 months. Find out the time of the moonrise and moonsets (resources listed below). Plan to make an observation while the Moon is above the horizon, including during the day. For each observation, you should do the following:

1. Record the date, the time of moonrise and moonset on that day, as well as the time of your observation.
2. Make a sketch of the moon with the terminator. The terminator is the line separating the light and dark parts of the Moon. Make sure to accurately represent the placement, curvature, and orientation of the terminator with respect to the horizon. Include in this sketch any nearby stars that are visible and try to identify and label them. Draw the horizon and indicate which direction you are facing. This sketch should fill at least half a page.
3. As best you can, mark on the star map the position of the Moon and label it with the date.
4. Try to estimate the angular distance between the moon and the sun if it is daytime. Your calibrated hand is useful for this. If the sun is below the horizon, find out how long it has been between the sun set and your observation. Use the fact that the sun moves  $\sim 15^\circ$  per hour to estimate how far the sun is below the horizon.

Once you have your (minimum) 8 sketches, please answer the following questions.

1. What direction does the Moon appear to move, relative to the background stars? (ie. from east to west or west to east?)
2. Comment on the Moon's motion relative to the ecliptic.
3. Using your chart of the Moon's position with respect to the stars, how fast is the Moon's motion in degrees per day? How many days does it take the Moon to return to the same position with respect to the background stars? This is called the sidereal period.
4. Using your sketches, find two drawings where the Moon had almost the same phase. How many days apart are these sketches? This is called the Moon's synodic period.

### **Resources for finding starmaps, sun and moon rise and set times:**

Observer's Handbook ( Royal Astronomical Society of Canada, available at the Bookstore)

Clear Dark Sky (Note: There is a link for a starmap on this page that is useful):

<http://www.cleardarksky.com/cgi-bin/sunmoondata.py?Mn=Solar%20Power&id=Winnipeg>

Weather Underground

<https://www.wunderground.com/weather/ca/winnipeg/49.88%2C-97.16>

Software and Websites:

Stellarium ( highly recommended, free software)

# EQUATORIAL SKY CHART

