

HOMEWORK #4 (due start of class Monday, January 27)
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Name _____

LEARNING GOALS:

- Understand the Moon's sidereal and synodic revolution periods.
- Add daily observations of the Moon's location and phase to your journal.
- Continue observing phenomena in the sky (night and day) and recording in your journal.

TO RECEIVE FULL CREDIT:

1. If you submit multiple pages, staple them together. (5 points)
2. To receive any credit on these problems, you must **show how** you derived your answer by writing all the logical steps that led you to it.
3. All sentence responses must be **typewritten and in complete sentences**. You may handwrite any arithmetic. Use good English grammar.
4. **If you work more than three hours on this assignment, you should stop, record your work here, and contact Dr. McCarthy.**

1. Reading:

In our online textbook, read sections 4.5 ("*Phases and Motions of the Moon*") and 4.7 ("*Eclipses of the Sun and Moon*").

The Moon will be at New phase on Saturday (Jan. 25). Based on the reading, on what day will the Moon be at First Quarter phase?

2. Sidereal vs. synodic periods of the Moon

Previously we discussed the difference between a "sidereal day" and a "solar day." Because of the Earth's revolution around the Sun, any particular star rises about 4 minutes earlier each day and we see different constellations in different seasons. Similarly, the Moon revolves around the Earth and we can define two periods of revolution, namely the Moon's "sidereal period" (27.3 days) and its "synodic period" (29.5 days). Play with the following animation to understand this effect. This animation uses Flash software that might not be enabled on your computer, especially Macs. Let Dr. McCarthy know if you have any difficulties, and he'll find an alternative.

<http://www.sumanasinc.com/webcontent/animations/content/sidereal.html>

3. Answer the following questions.

- a. The Moon revolves eastward around the Earth once in ~30 days and so the Moon appears to move in our sky with respect to the background stars. About how many degrees per day does the Moon move?
- b. On Jan. 25 (Saturday) the Moon will be at New phase and will set at sunset, 5:51 pm. Using your answer to part (3a) and the fact that Earth rotates ~15 deg/hour, predict when the Moon will rise the next day.

4. This week add the following to your journal: Daily recordings of the Moon's location and phase. Continue observing phenomena in the sky (night and day) and recording in your journal.

Describe your observations in your journal. In each case, do your best to measure and record the AZ/EL coordinates of each object and the time of observation. Make a sketch.

Required objects:

- a. Satellite passes. Consult this Web site for visible satellites:

<https://heavens-above.com/main.aspx?lat=32.2332&lng=-110.949&loc=21%22+Telescope&alt=747&tz=Arizona>

- b. Moon: Throughout the week, record the daily position of the Moon (AZ/El, time) and its phase.
- c. Venus
- d. Constellations: Orion, Cassiopeia
- e. Stars: Polaris, Sirius, Betelgeuse, Rigel
- f. Anything unusual you notice. Be sure to record the time and location so we can figure out the likely cause afterwards.

Your journal should also contain:

- a. Observations of daytime shadows (umbra & penumbra)
- b. Ongoing locations of sunset (AZ/EL & time) and/or sunrise
- c. Your measurement of the angle of your fist
- d. What is the faintest star your eye can see in the constellation Cassiopeia?