

HOMEWORK #3 (due start of class Friday, January 24)
(copyright D. McCarthy)

Name _____

LEARNING GOALS:

1. Continue recording observations in your journal.
2. Understand why planets move along the ecliptic and sometimes appear close together.

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. Read Chapter 2.1 in our online textbook to understand the evening sky, celestial coordinates, and the motions of the Sun, Earth, Moon, and planets.

- a. From where on Earth could you observe all of the stars during the course of a year? What fraction of the sky can be seen from the North Pole?

2. Continue observing phenomena 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. Venus
- c. Constellations: Orion, Cassiopeia
- d. Stars: Polaris, Sirius, Betelgeuse, Rigel
- e. Anything unusual you notice. Be sure to record the time and location so we can figure out the likely cause afterwards.

Your journal should already contain:

- a. Observations of daytime shadows (umbra & penumbra)
- b. Sunset locations (AZ/EL).

3. Figure #1 shows an “orrery” of our Solar System. It depicts the relative locations of the planets in their orbits around the Sun over the next few months. The positions of the planets Mercury, Venus, Earth, and Mars are each indicated by circles spread around their respective orbits. Arrows show the directions to Jupiter and Saturn which are much farther away. Lines between Earth and the planets indicate their respective directions. Answer the following questions:

- a. Which of these planets can be seen around sunset?
- b. Which of these planets can be seen just before sunrise?
- c. Explain why Mercury and Venus can never be seen from Earth at midnight.

4. Figure #2 shows simulated “conjunction” of Mars and Jupiter on March 20, respectively.

- a. Explain why those two planets appear close together but are actually far from each other.
- b. Explain why the planets Mars, Jupiter, and Saturn are oriented along a line (i.e., the “ecliptic”)?

FIGURE #1. A Solar System Orrery for January 2020

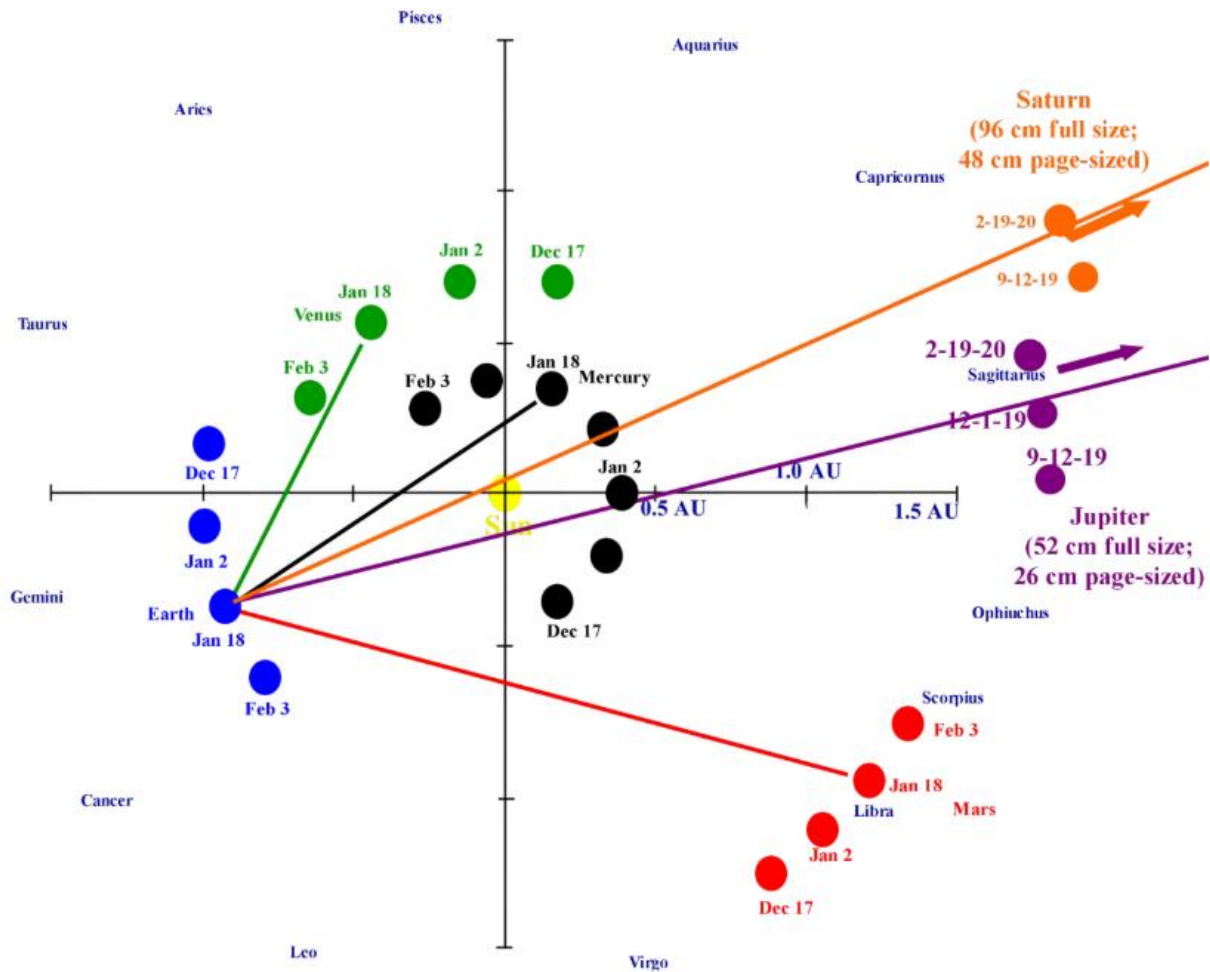


FIGURE #2. Stellarium’s simulated “conjunction of Mars and Jupiter: Southern sky ~4am on March 20, 2020.

