

Motion & Phases of Venus & Mars

Observing:

1. **a.** (4 pts.) Attach your observation sheet for the **positions of Venus**.
- b.** (4 pts.) Attach your observation sheet for the **positions of Mars**.
- c.** (6 pts.) Attach your observation sheet for the **phase & diameter of Venus**
- d.** (1 pt.) Attach your observation sheet for **Mars Observing (features on Mars)**

On an attached page, answer the following questions:

2. (4 pts.) Look at your observations of the *positions* of Mars and Venus during the semester. For each planet, was its motion **eastward** or **westward** during the semester, or **both** (describe)? For each planet, did it exhibit **retrograde motion** or **direct (“prograde”) motion**, or **both**? **Explain.**

3. **a.** (5 pts.) For Venus, Earth, and Mars, plot the planet’s **ecliptic longitude** (degrees) and **distance from the Sun** (AU) on the polar plot provided, from late August through Early December. **Label** a few of the positions with their approximate dates.

b. (1 pt.) What is the position of Earth relative to any planets that showed **direct** motion, *versus* the position of Earth relative to any planets that showed **retrograde** motion during the semester? Does this agree with what you have learned about retrograde motion... specifically, when it should or should not be exhibited by a planet?

4. **a.** (3 pts.) What was the **range of phases** that Venus showed as we observed it during the semester? How does its phase correspond to its **apparent diameter**? Look at your plot for question (3)... was Venus getting **closer to** or **farther from** Earth during the semester, and does this agree with your observations of Venus’s apparent size? What was Venus’s **position** relative to the Sun and Earth, and does this agree with your observations of Venus’s phase?

b. (1 pt.) What was the **phase (or range of phases)** that Mars showed as we observed it during the semester? How does its phase correlate with its **apparent size**? Look at your plot for question (3)... what was Mars’s **position** relative to the Sun and Earth, and does this agree with your observations of Mars’s phase?

c. (2 pts.) If we were to make observations through the telescope of *all* of the planets over a period of, say, three Earth-years, what would be the **range of phases** that each would exhibit?

5. (4 pts.) Suppose that a few years from now, you go outside at midnight, and with your unaided eyes you notice a very bright object nearly overhead, in one of the zodiacal constellations. You deduce (correctly) that it is a planet. **Which** of the other eight planets could it be, and which could it definitely *not* be? **Explain** your reasoning.

Planetary Ecliptic Longitude & Heliocentric Distance Data

VENUS		
Date (HST)	Ecliptic Longitude, degrees	Distance from Sun, AU
2005-Aug-01	209.4	0.72
2005-Aug-11	225.4	0.72
2005-Aug-21	241.4	0.72
2005-Aug-31	257.3	0.73
2005-Sep-10	273.1	0.73
2005-Sep-20	288.9	0.73
2005-Sep-30	304.8	0.73
2005-Oct-10	320.6	0.73
2005-Oct-20	336.4	0.73
2005-Oct-30	352.3	0.73
2005-Nov-09	8.2	0.73
2005-Nov-19	24.1	0.72
2005-Nov-29	40.1	0.72
2005-Dec-09	56.2	0.72
2005-Dec-19	72.2	0.72
2005-Dec-29	88.4	0.72
EARTH		
2005-Aug-01	309.3	1.01
2005-Aug-11	318.8	1.01
2005-Aug-21	328.4	1.01
2005-Aug-31	338.1	1.01
2005-Sep-10	347.8	1.01
2005-Sep-20	357.5	1.00
2005-Sep-30	7.3	1.00
2005-Oct-10	17.2	1.00
2005-Oct-20	27.1	1.00
2005-Oct-30	37.1	0.99
2005-Nov-09	47.1	0.99
2005-Nov-19	57.2	0.99
2005-Nov-29	67.3	0.99
2005-Dec-09	77.4	0.98
2005-Dec-19	87.6	0.98
2005-Dec-29	97.8	0.98
MARS		
2005-Aug-01	345.5	1.38
2005-Aug-11	351.9	1.39
2005-Aug-21	358.2	1.39
2005-Aug-31	4.4	1.40
2005-Sep-10	10.6	1.40
2005-Sep-20	16.7	1.41
2005-Sep-30	22.8	1.42
2005-Oct-10	28.7	1.43
2005-Oct-20	34.6	1.44
2005-Oct-30	40.4	1.45
2005-Nov-09	46.1	1.46
2005-Nov-19	51.7	1.48
2005-Nov-29	57.2	1.49
2005-Dec-09	62.6	1.50
2005-Dec-19	68.0	1.51
2005-Dec-29	73.2	1.53

