

Answers will be put on angel at 1:01pm, Mon., 9/26. Late papers will be accepted until then.

Planet	Period (yr)	Semi-major axis (AU)	Eccentricity
Mercury	0.241	0.387	0.206
Venus	0.615	0.723	0.007
Earth	1.000	1.000	0.017
Mars	1.881	1.523	0.093
Jupiter	11.86	5.202	0.049
Saturn	29.46	9.539	0.056

1. **Preparation** (not graded).
 - a. In one sentence, state Kepler's First Law. Is this law about the property of a planet, or is it a relationship between different planets? Draw a diagram that includes the elements of the law.
 - b. Answer the same questions for Kepler's Second Law.
 - c. Answer the same questions for Kepler's Third Law.
2. **A Comet** has an orbital period of 100 years, and its eccentricity is 0.97.
 - a. (4 pts.) How far from the sun does it get? Give your answer in AU.
 - b. (not graded) How close to the sun does it get?
 - c. (2 pts.) What the ratio between its fastest and slowest orbital speeds?
3. **A new planet** is found in the solar system. Its period is 36 days or 0.1 year. Assume the orbit is circular.
 - a. (2 pts.) Is its orbit smaller or larger than that of Mercury around the sun? Explain how you can answer this without computing a numerical answer. (Use the table.)
 - b. (3 pts.) Compute the radius of the orbit.