PROBLEM SET 12
Physics 2021

1. What percentage of all *planetary* material in the Solar System is contained in Jupiter?

2. What is the ratio of Saturn's volume to the volume of the Earth?

3. Using orbital data for Almathea, calculate the mass of Jupiter. Give your answer in Earth masses.

4. Use Jupiter's equatorial diameter and the rotation period at Jupiter's equator to calculate the speed at which an object at the cloud tops along Jupiter's equator moves around the center of the planet.

5. Estimate the wind velocities in the Great Red Spot, which rotates with a period of about 5.5 days. Assume the Red Spot is circular and has a diameter 2.5 times that of the Earth.

6. As seen from Earth, the intervals between successive edge-on presentations of Saturn's rings alternate between about 13 years, 9 months to about 15 years, 9 months. Why do you think these two intervals are not equal?

7. Use Newton's form of Kepler's Third Law to calculate the orbital period of particles in the outer edge of Saturn's A ring and in the inner edge of the B ring.

8. The *Cassini* division involves a 2-to-1 resonance with the moon Mimas. Does the location of the Encke gap – 133,500 km from Saturn's center – correspond to a resonance with one of the other moons? If so, which one?