

The Copernican Revolution

9/14/2009

Opening Discussion

- <http://www.youtube.com/watch?v=f4zV4pJ8MwM>
- Turn in your assignments at the front of the room.
- Have you see anything interesting in the news?
What did we talk about last class?
- Losing knowledge (fear of the unknown/knowledge, dispersion of information, societal collapse, locality, format/computers, societal collapse)
- What happens to a human exposed to space?
- <http://www.youtube.com/watch?v=HEheh1BH34Q>

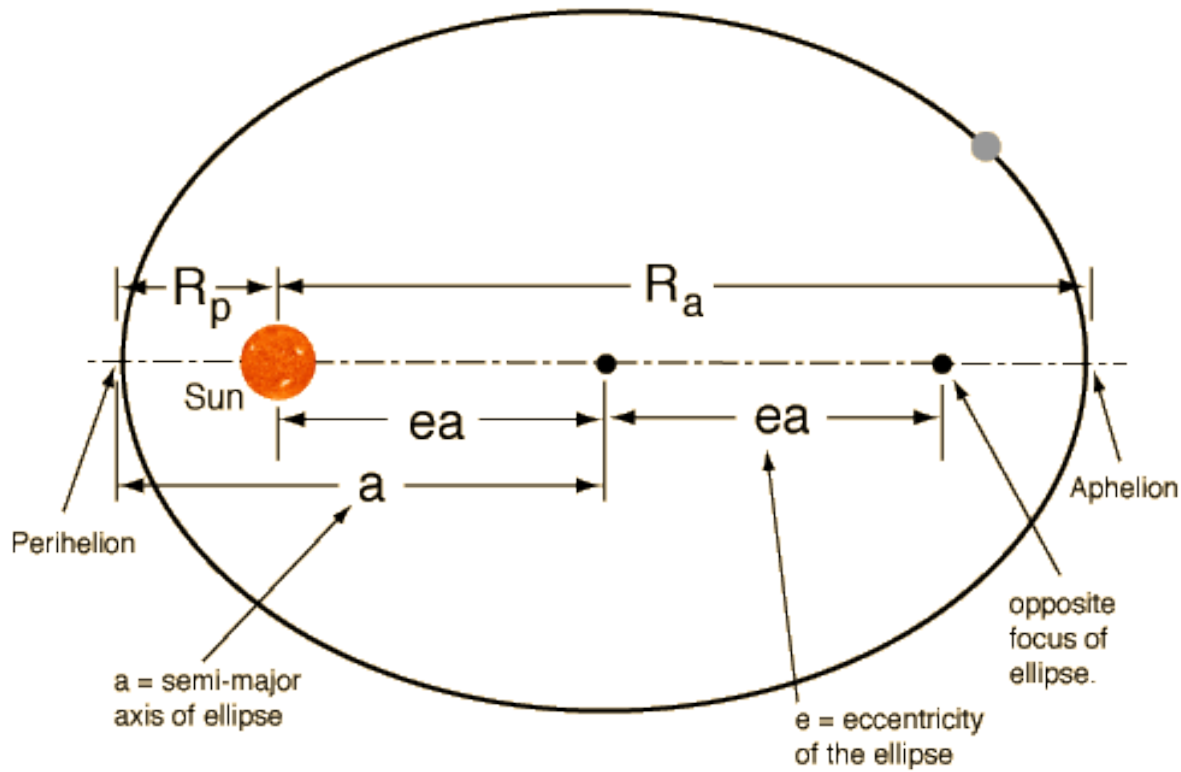
The Copernican Revolution

- The Renaissance was a great time of discovery in Europe and it led to the foundations of modern astronomy and science as a whole.
- Nicholas Copernicus proposed a Sun centered model of the solar system, but he stuck with circles and epicycles so his predictions were no better than Ptolemy
- Tycho Brahe was the greatest naked eye observer ever. He compiled observations of the planets accurate to 1 arcminute. He died a rather untimely death, but asked his student to make use of his observations.

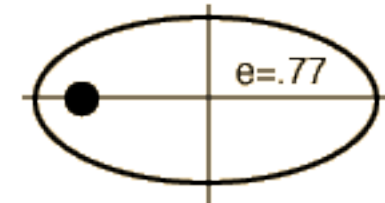
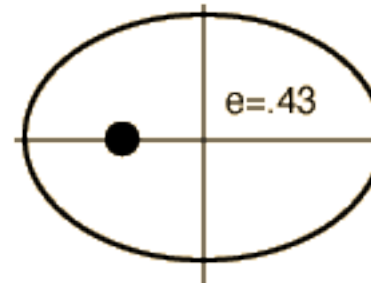
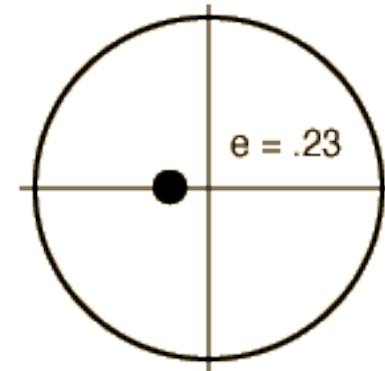
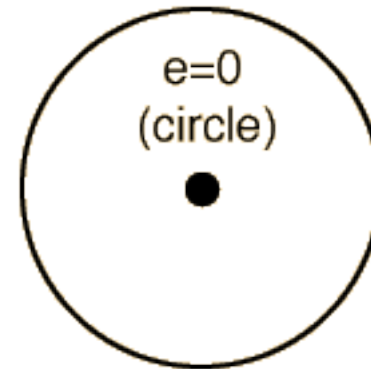
Kepler's Laws

- Johannes Kepler had such great faith in the accuracy of Tycho's observations that he developed a model that didn't use circles based on 8 arcminutes of discrepancy.
- Kepler developed 3 laws of planetary motion in a heliocentric model.
 - Planets orbit in ellipses with the Sun at one focus.
 - The line from the Sun to the planet sweeps out equal areas in equal times.
 - $p^2 = a^3$ (p is period in years and a is semimajor axis in AU)

Kepler's First Law

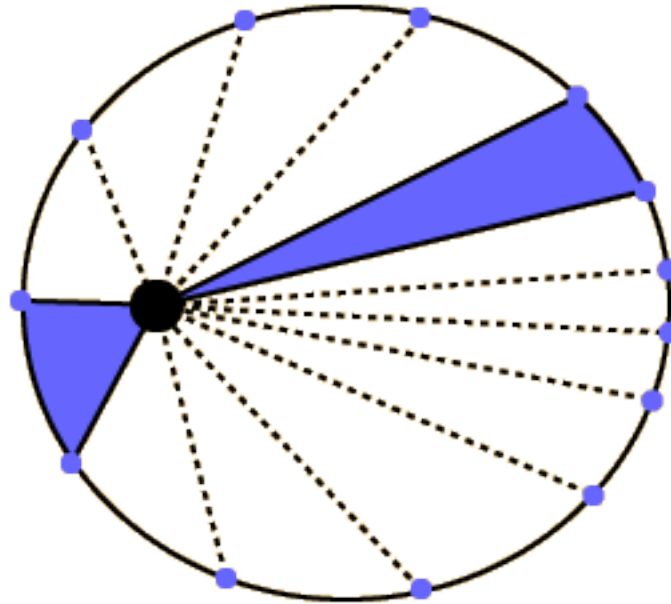


$$R_a = a(1+e) \quad R_p = a(1-e)$$



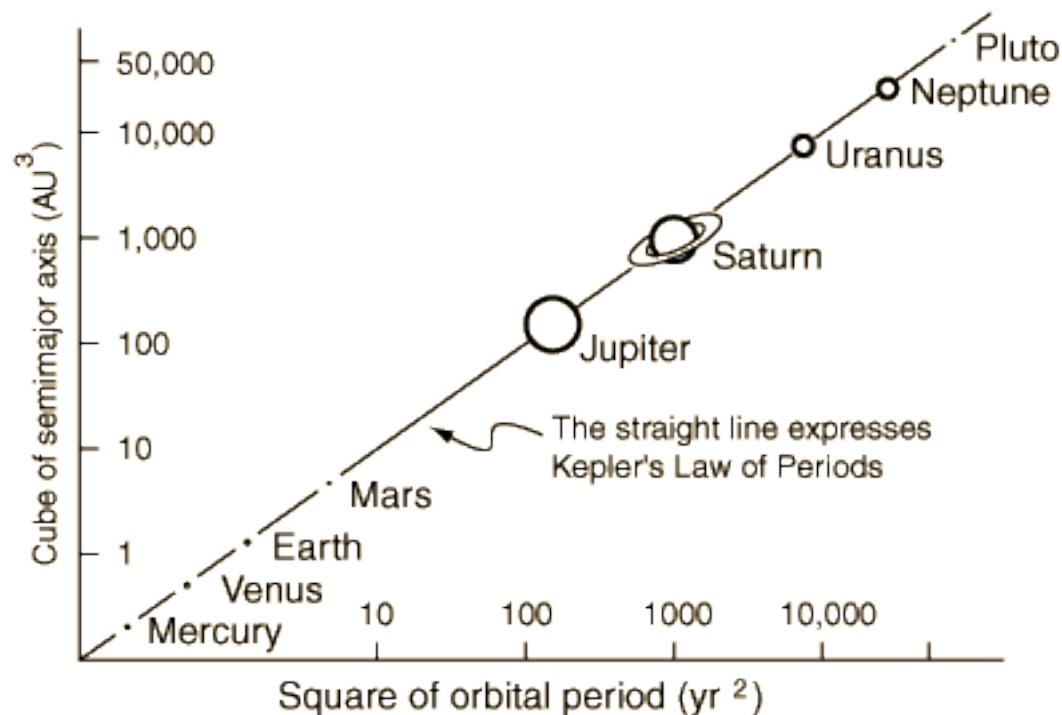
Kepler's Second Law

- The main implication of this is that objects move slower when they are further from the Sun and faster when they are closer.



Kepler's Third Law

- Math works nicely using AU and years for our Sun.



Galileo

- The heliocentric model didn't become the default until Galileo Galilei turned a telescope to the sky and tore down most of the beliefs of Aristotle.
 - He saw that the Sun had sunspots and the Moon had craters and mountains. (Heavens not perfect.)
 - He found that the Milky Way was made of stars. (Parallax)
 - He saw 4 moons orbiting Jupiter. (Don't orbit the Earth.)
 - He saw that Venus has phases that can only be matched by moving around the Sun.
- Galileo also demonstrated that objects continue to move unless acted on by an outside force.

Minute Essay

- What questions do you have about today's lecture?
- We have our second quiz next class.
- The first midterm is a week from today. It will cover the first three chapters and S1.