

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=HEehh1BH34Q>

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.

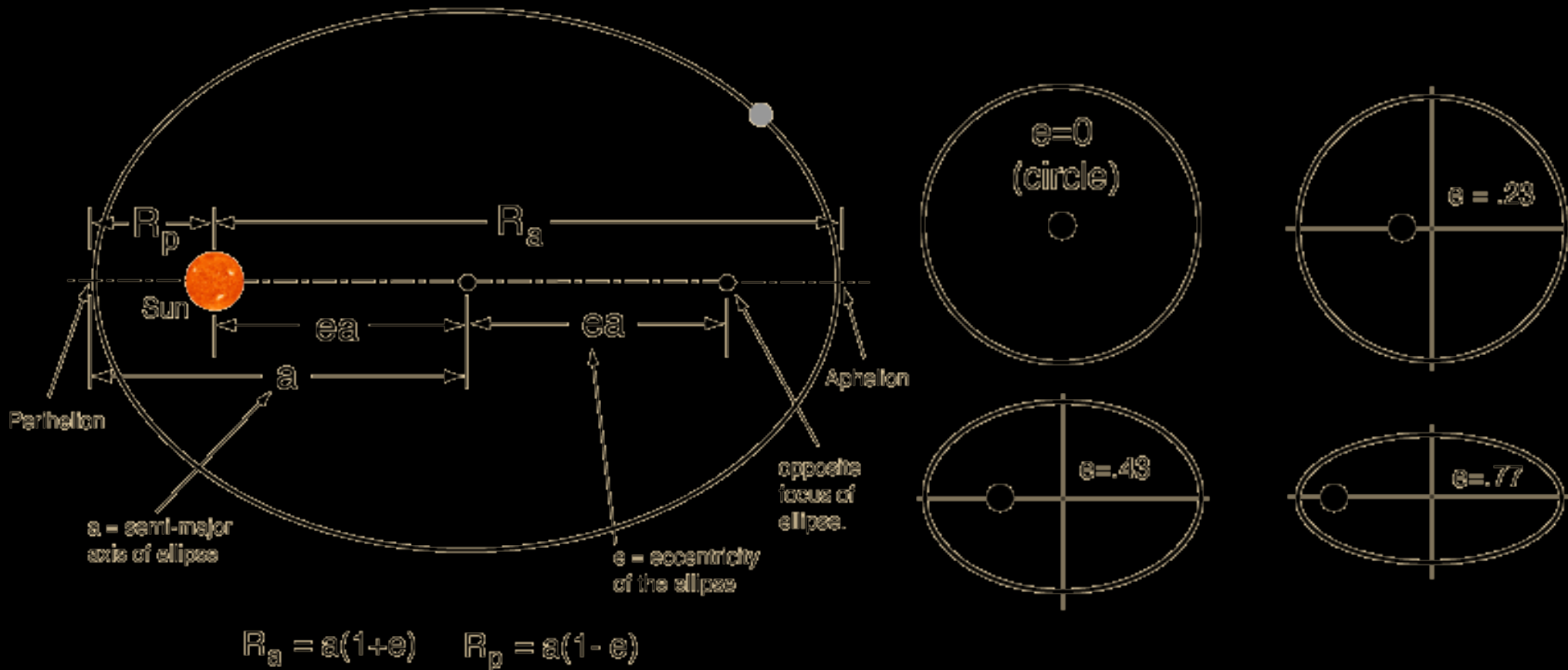
Kepler developed 3 laws of planetary motion in a heliocentric model.

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.

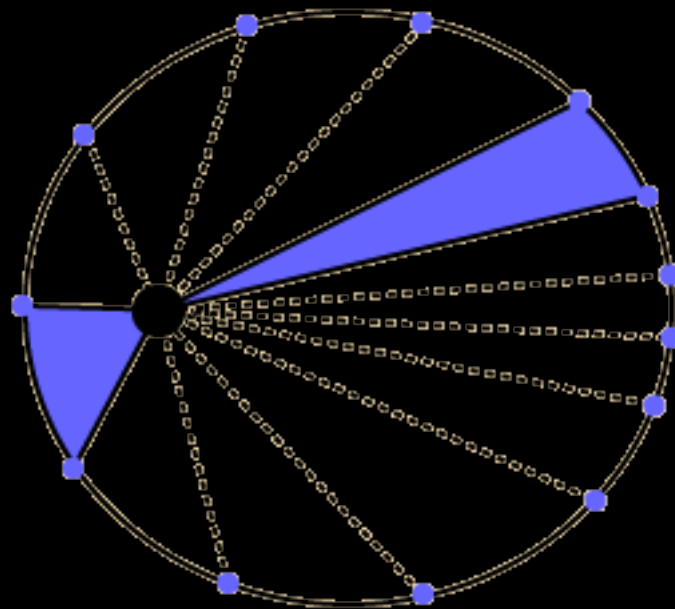
$p^2 = a^3$ (p is period in years and a is semimajor axis in AU)

Kepler's First Law



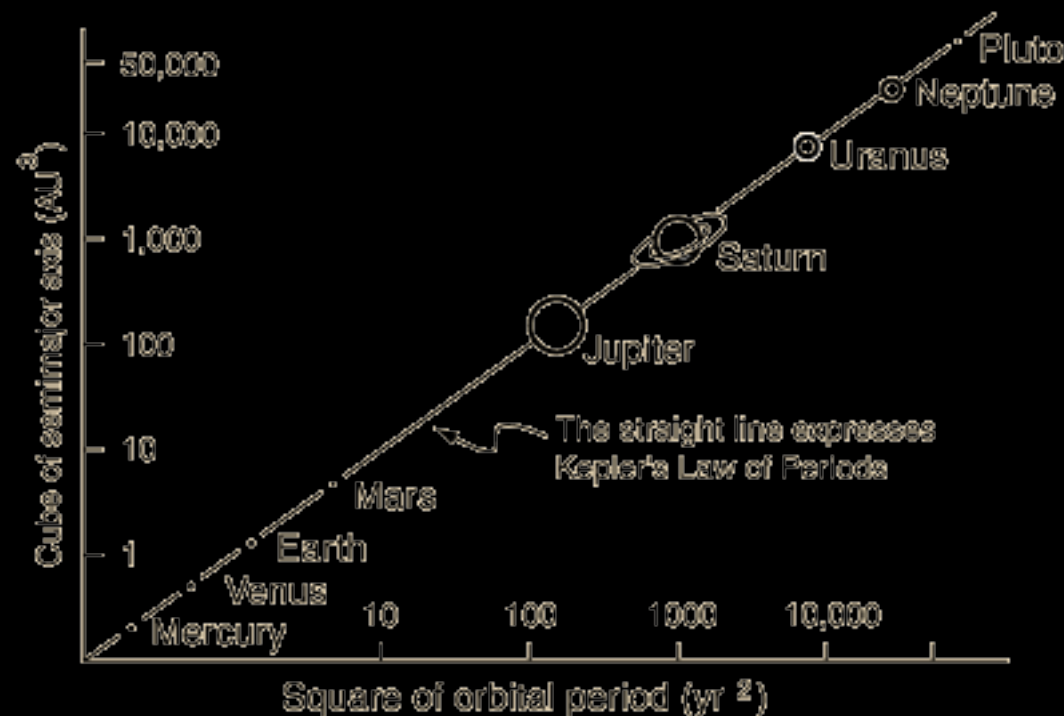
Kepler's Second Law

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.