

Preparation for Test 1—27 Sep

- Test 1
 - Wed 9/29
 - Covers
 - Material through class of 9/20. Newton is not on the test.
 - Homework 1-3
 - First test counts only 5% of course grade.
 - Bring one 8.5×11” cheat sheet (front & back)
 - Tests are written, not multiple choice. Average was 67% for Fall 2009.
- How to study. Focus on main ideas, then details.
- Missouri (Show me) Club
 - Tues 9/28; 7:40-8:40pm, room 1420.
- Practice test (test from fall 2009). Link is on syllabus on angel.
 - [17](#) [H02](#) Kepler's Laws of planetary motion. §3.3
 - 1838—Size of the Solar System & Distances to the Nearest Stars
 - [20](#) Galileo invents the telescope. ([Sidereus Nuncius](#), pp. 64–67.)
 - [22](#) Newton's laws of motion & gravity §3
 - [24](#) [H03](#) How big is the solar system? Parallax of Mars and Venus. pp
 - [27](#) Preparation for test. [Practice test](#) [Practice test answer](#)
 - 28 Missouri (Show me) Club. 7:40-8:40pm, room 1420.
 - 29 Test

Preparation for Test 1

- Do the practice test (Test 1 from Fall 2009)
 - Link on syllabus on angel
- Review the homework. For each question,
 - What is the main idea?
 - What are less important ideas? How are they related to the big ideas?
 - What are details?
- For each class,
 - What are the one or two big ideas? You must understand these.
 - What are less important ideas? How are they related to the big ideas?
 - What are details?

- What are the one or two big ideas? You must understand these.
- What are less important ideas?
 - Examples of less important ideas
 - Definitions
 - Drawings
 - How are they related to the big ideas?
- What are details?

Kepler's Laws—17 Sep

- Public observing
 - MSU Observatory. Go south on Farm Lane to the end, then turn right.
 - Fri & Sat 9:00-11:00
- Read pages in Galileo's *Starry Messenger* for Mon
 - See link on syllabus
 - How Galileo discovered moons of Jupiter
- The discovery of the laws of motion, the first science.
 - *De Revolutionibus Orbium Coelestium*, Copernicus, 1543
 - *Astronomia Nova*, Kepler, 1609
 - *Philosophiae Naturalis Principia Mathematica*, Newton, 1687
- Kepler's three laws.

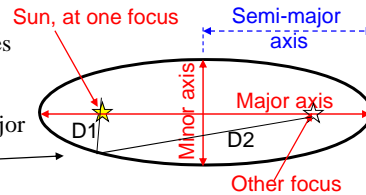


Kepler at 39, Sternwarte Kremsmünster
<http://members.nextra.at/stewar/>

Copernicus	1473–1543
Columbus sails	1492
Tycho Brahe	1546–1601
Shakespeare	1564–1616
Johannes Kepler	1571–1630
Jamestown	1607
King James Bible	1611
Harvard College	1636
Isaac Newton	1642–1727

Kepler's First Law of Planetary Motion 1605

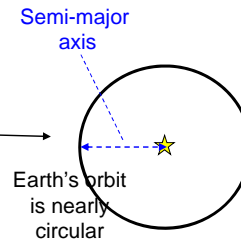
- The path of a planet is an ellipse.
 - Ellipse is figure for which $D_1 + D_2$ does not change
 - The sun is at one focus.
 - Eccentricity = (dist between foci)/(major axis)



- For this ellipse, the eccentricity is approximately

- 0
- 0.1
- 0.3
- 0.7
- 0.9

- Same question for



- What are the one or two big ideas? You must understand these.

- What are less important ideas?

- Examples of LII
 - Definition
 - Drawing
- How are they related to the big ideas?

- What are details?

- For a point on an ellipse, the sum of distances between the point and the two foci is a constant.
- The path of a planet is an ellipse with the sun at one focus.
- The eccentricity is the distance between the two foci divided by the major axis.
- The semi major axis is half the long axis.
- A circle is an ellipse.

- Identify a "big idea," a less important idea, a detail.

- Idea C is ____.

- BI.
- LII.
- D.

- What are the one or two big ideas?
You must understand these.
- What are less important ideas?
 - Examples of LII
 - Definition
 - Drawing
 - How are they related to the big ideas?
- What are details?
 - A. For a point on an ellipse, the sum of distances between the point and the two foci is a constant.
 - B. The path of a planet is an ellipse with the sun at one focus.
 - C. The eccentricity is the distance between the two foci divided by the major axis.
 - D. The semi major axis is half the long axis.
 - E. A circle is an ellipse.
- **Hwk 2, Q2: A Comet** has an orbital period of 100 years, and its eccentricity is 0.967. (4 pts.) How far from the sun does it get? How close to the sun does it get? Give your answer in AU.
- 2. Which was not a big idea but was essential for me to do Q 2 on Hwk 3?

Kepler's Second Law 1602

- The line joining the planet and the sun sweeps out equal areas in equal amounts of time
 - Planet moves slowly when it is far from sun
 - Planet moves rapidly when close to sun

[Kepler2ndLaw](#)

Third Law 1618

- The size and periods of the planetary orbits are related by
$$P^2 = a^3$$
 - where P is the period in years and
 - a is the half of the major axis in astronomical units
- 1. A 10th object (planet?) was found beyond the orbit of Pluto. ___ has the shorter period.
 - A. Pluto
 - B. 10th object
 - C. Not enough information to answer

3rd Law

<http://web.cuug.ab.ca/~kmcclary/fastosolar.html>

Distilling and expanding a big idea

- Kepler's Laws have to do with planetary motion. What parameters does each relate?
- Do they apply to objects other than planets?
- What observations or ideas were necessary for the development of these?
- In what way were these important in the development of astronomy?
- K1: A planet's path is an ellipse with the sun at one focus.
- K2: A planet "sweeps" out the same area in an equal amount of time.
- K3: The planets' periods P and semi-major axes a are related by
$$P^2 = a^3$$

Distilling and expanding a big idea

- Kepler's Laws have to do with planetary motion. What parameters does each relate?
- 1. Which of Kepler's Laws relates the speeds of two different planets?
 - A. K1
 - B. K2
 - C. K3
- K1: A planet's path is an ellipse with the sun at one focus.
- K2: A planet "sweeps" out the same area in an equal amount of time.
- K3: The planets' periods P and semi-major axes a are related by
$$P^2 = a^3$$

Distilling and expanding a big idea

- Kepler's Laws have to do with planetary motion. What parameters does each relate?
- Do they apply to objects other than planets?
- What observations or ideas were necessary for the development of these?
- In what way were these important in the development of astronomy?
- K1: A planet's path is an ellipse with the sun at one focus.
- K2: A planet "sweeps" out the same area in an equal amount of time.
- K3: The planets' periods P and semi-major axes a are related by
$$P^2 = a^3$$