Astronomy

Fall 2026

Weeks 7-8

Tuesday, September 22

- T:**(5) Science concepts. The student understands how astronomy influenced and advanced civilizations. The student is expected to:**
- **5B** research and evaluate the contributions of scientists, including Ptolemy, Copernicus, Tycho Brahe, Kepler, Galileo, and Newton, as astronomy progressed from a geocentric model to a heliocentric model; and

(6) Science concepts. The student conducts and explains astronomical observations made from the point of reference of Earth. The student is expected to:

- **6D** understand the difference between astronomy and astrology, the reasons for their historical conflation, and their eventual separation.
- O: I will be able to explain the astronomical ideas presented by Galileo
- D: after watching a video, discussing with my peers, completing a Stellarium project, and conducting a close-read.

Journal 2.1

- What was my grade for the first 6-weeks? Am I happy with it? What will I do this six-weeks as compared to the 1st six-weeks?

According to Galileo’s observations, which model of the Universe does he have evidence for?
Is this enough evidence to prove a heliocentric Universe?



Thursday, September 24

- T:**(5) Science concepts. The student understands how astronomy influenced and advanced civilizations. The student is expected to:**
- **5B** research and evaluate the contributions of scientists, including Ptolemy, Copernicus, Tycho Brahe, Kepler, Galileo, and Newton, as astronomy progressed from a geocentric model to a heliocentric model; and

(6) Science concepts. The student conducts and explains astronomical observations made from the point of reference of Earth. The student is expected to:

- **6D** understand the difference between astronomy and astrology, the reasons for their historical conflation, and their eventual separation.
- O: I will be able to explain Kepler's Law of planetary motion
- D: by discussing data with my group, participating in a lecture, and answering questions from the textbook.

Astronomy in the Renaissance: Tycho Brahe

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- Tycho Brahe (1546 to 1601)
- Made meticulous measurements of the planets.

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Tycho Brahe's Observations

- Observed supernova and comet
  - suggested that the heavens were both changeable &complex
  - Proposed compromise geocentric model,
  - observed no parallax

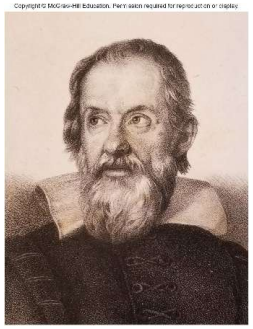
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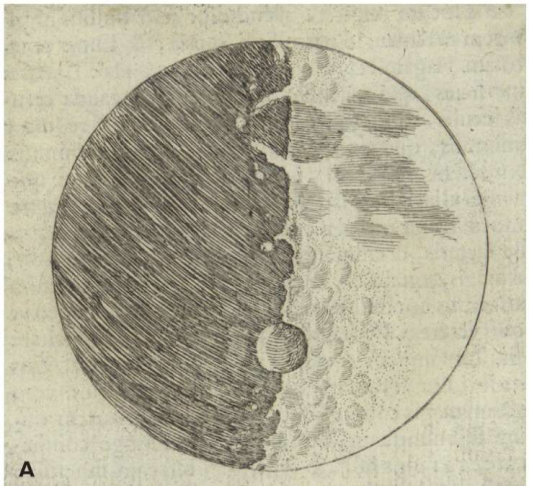
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Astronomy in the Renaissance: Galileo

- Galileo (1564 to 1642)
- First person to use the telescope for astronomy
  - The Moon is a ball of rock.



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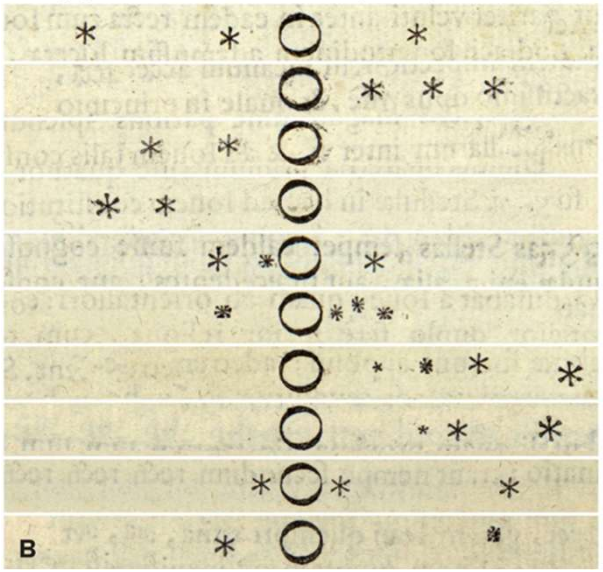


- Leopere di Galileo Galilei: Opere astronomiche. 1842-1853/ a. Galilei, Galileo, 1564-1642. Sidereus Nuncius. [1610] Library of Congress. Rare Books and Special Collections Division

Galileo’s Observations

- The Sun has spots: it’s imperfect, changes its appearance, and rotates.
- Jupiter has four moons orbiting it:
- Milky Way uncountable number of stars: Earth-centered universe is too simple.

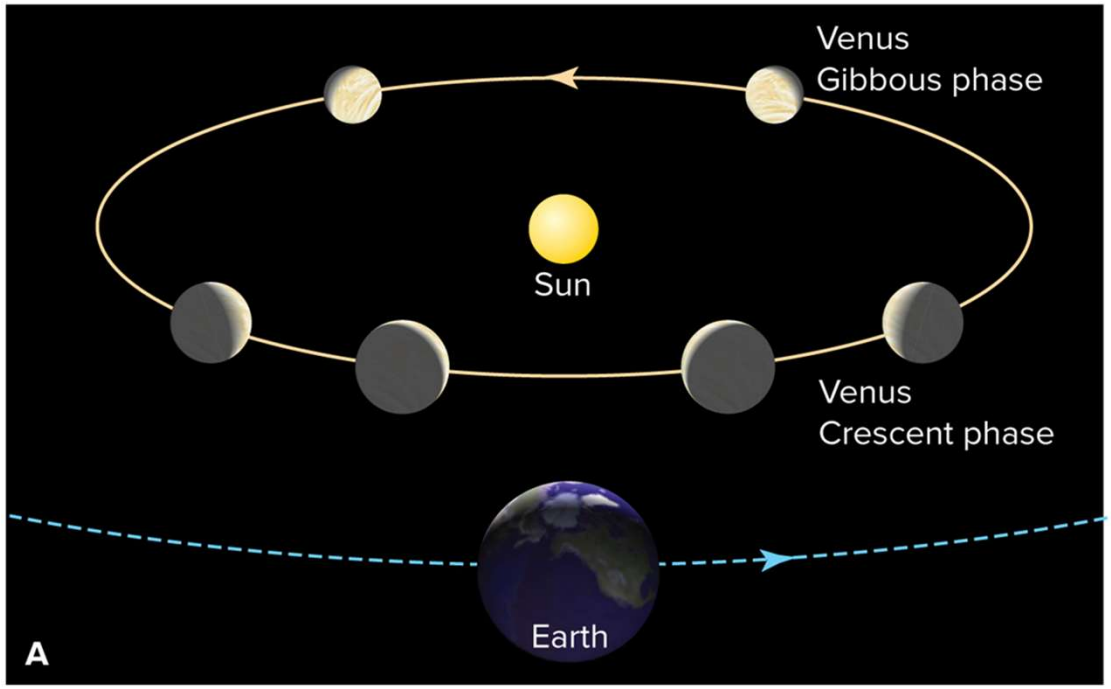
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Evidence for the Heliocentric Model

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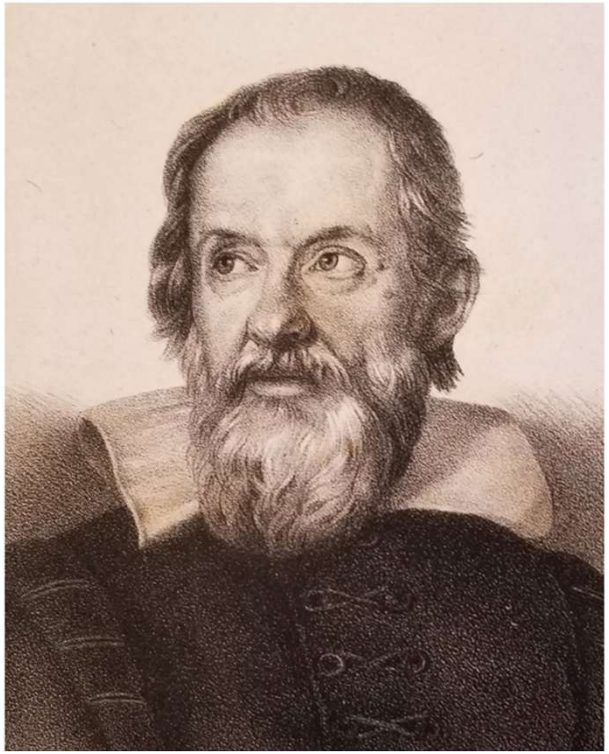


- Venus undergoes full phase cycle: Venus must circle Sun.

One of the Founders of Modern Science

- Credited with originating the experimental method for studying scientific problems.
- Deduced the first correct “laws of motion.”
- Was brought before the Inquisition and put under house arrest for the remainder of his life.

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- Le opera di Galileo Galilei: Opere astronomiche 1842-1853

Johannes Kepler

- Johannes Kepler (1571 to 1630)
- Using the very precise Mars data, Kepler showed the orbit to be an ***ellipse.***

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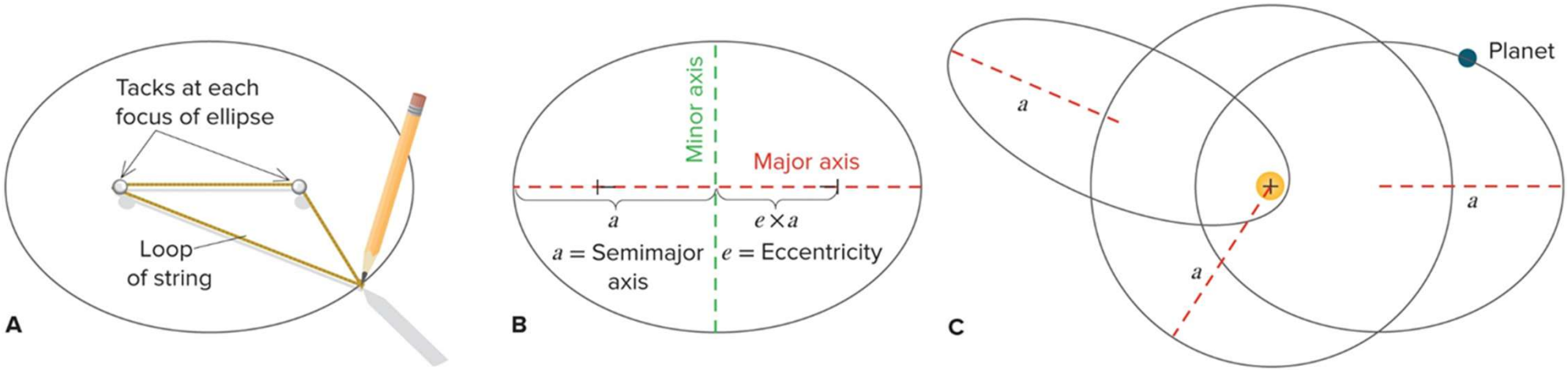


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Kepler's Success

- Planets follow ellipses with the Sun located at one of the two foci

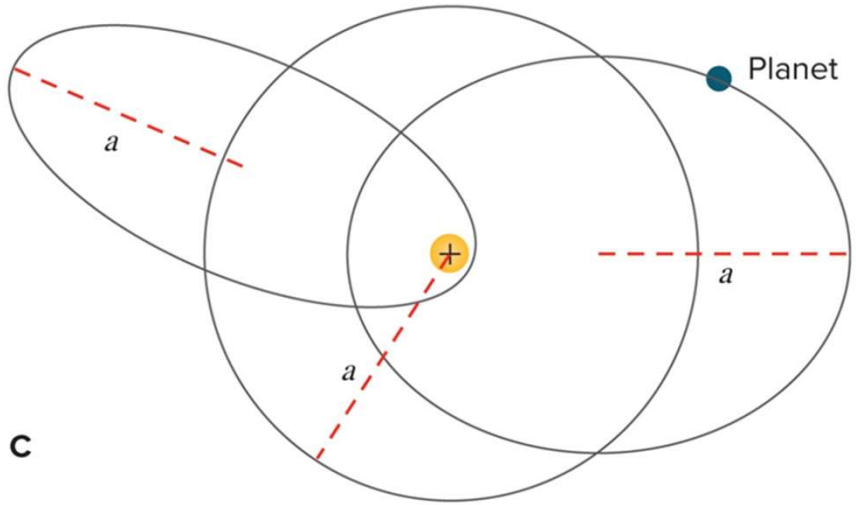
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Kepler's 1st Law

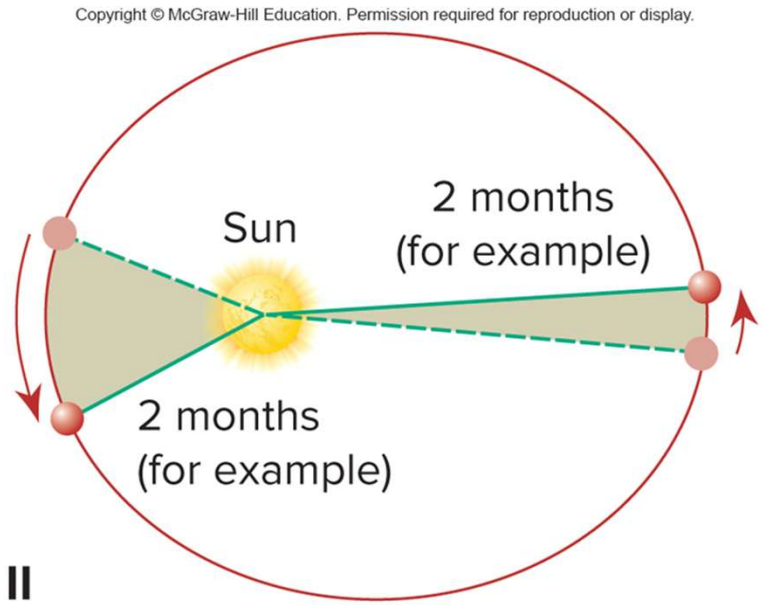
- Planets move in elliptical orbits with the Sun at one ***focus*** of the ellipse.

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Kepler's 2nd Law

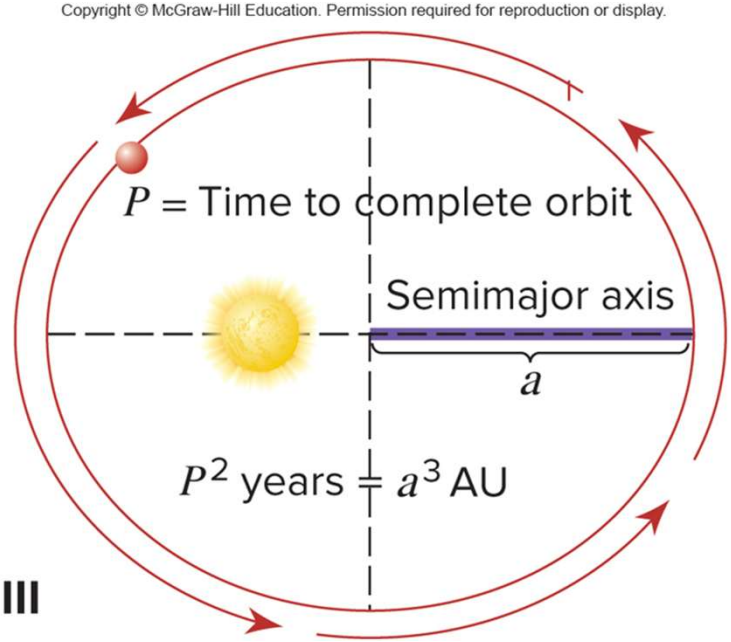
- The orbital speed of a planet varies so that a line joining the Sun and the planet will sweep out equal areas in equal time intervals.
- The closer a planet is to the Sun, the faster it moves.



Kepler's 3rd Law

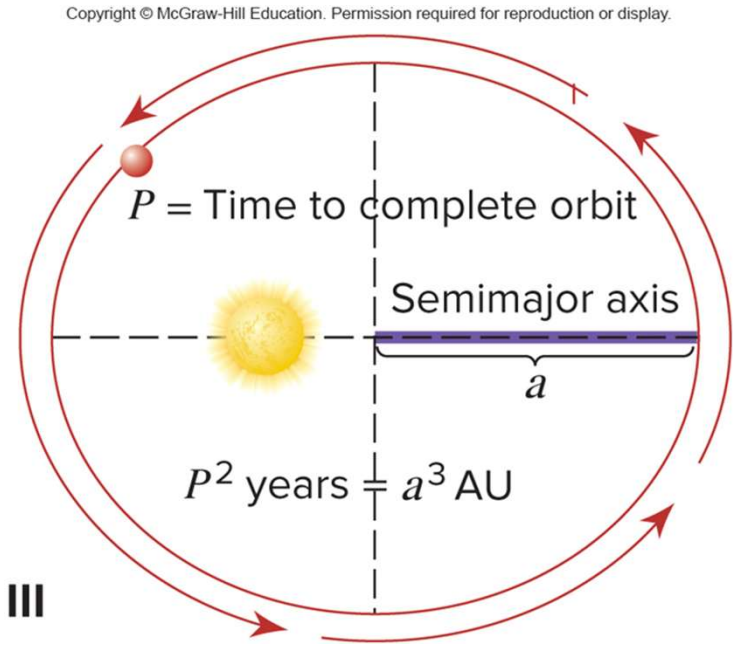
- The amount of time a planet takes to orbit the Sun is related to its orbit's size.
- The square of the period, P, is proportional to the cube of the ***semimajor axis,*** a.

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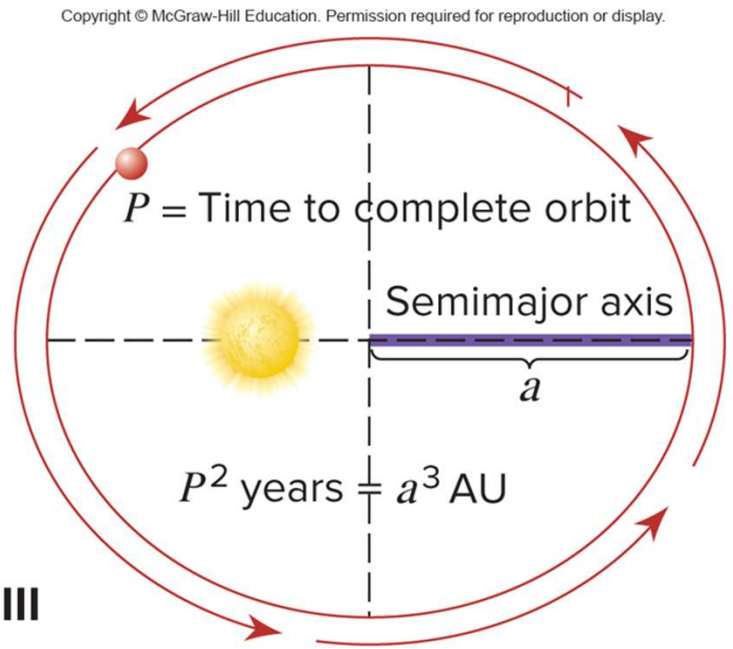
Kepler's 3rd Law: Period and Distance

- This law implies that a planet with a larger average distance from the Sun, which is the semimajor axis distance, will take longer to circle the Sun.
- Third law hints at the nature of the force holding the planets in orbit.



Kepler's 3rd Law: Still in Use Today!

- Third law can be used to determine the semimajor axis, a, if the period, P, is known, a measurement that is not difficult to make.



Tuesday, September 29

- T:**(5) Science concepts. The student understands how astronomy influenced and advanced civilizations. The student is expected to:**
- **5B** research and evaluate the contributions of scientists, including Ptolemy, Copernicus, Tycho Brahe, Kepler, Galileo, and Newton, as astronomy progressed from a geocentric model to a heliocentric model; and

(6) Science concepts. The student conducts and explains astronomical observations made from the point of reference of Earth. The student is expected to:

- **6D** understand the difference between astronomy and astrology, the reasons for their historical conflation, and their eventual separation.
- O: I will be able to explain the planets' orbits according to Kepler
- D: by completing 3 PhET simulations.

Thursday, October 1

- T:**5) Science concepts. The student understands how astronomy influenced and advanced civilizations. The student is expected to:**
- **5B** research and evaluate the contributions of scientists, including Ptolemy, Copernicus, Tycho Brahe, Kepler, Galileo, and Newton, as astronomy progressed from a geocentric model to a heliocentric model; and
- O: I will be able to explain the concepts of chapter 2
- D: by completing the MHE Smart Book assignment.