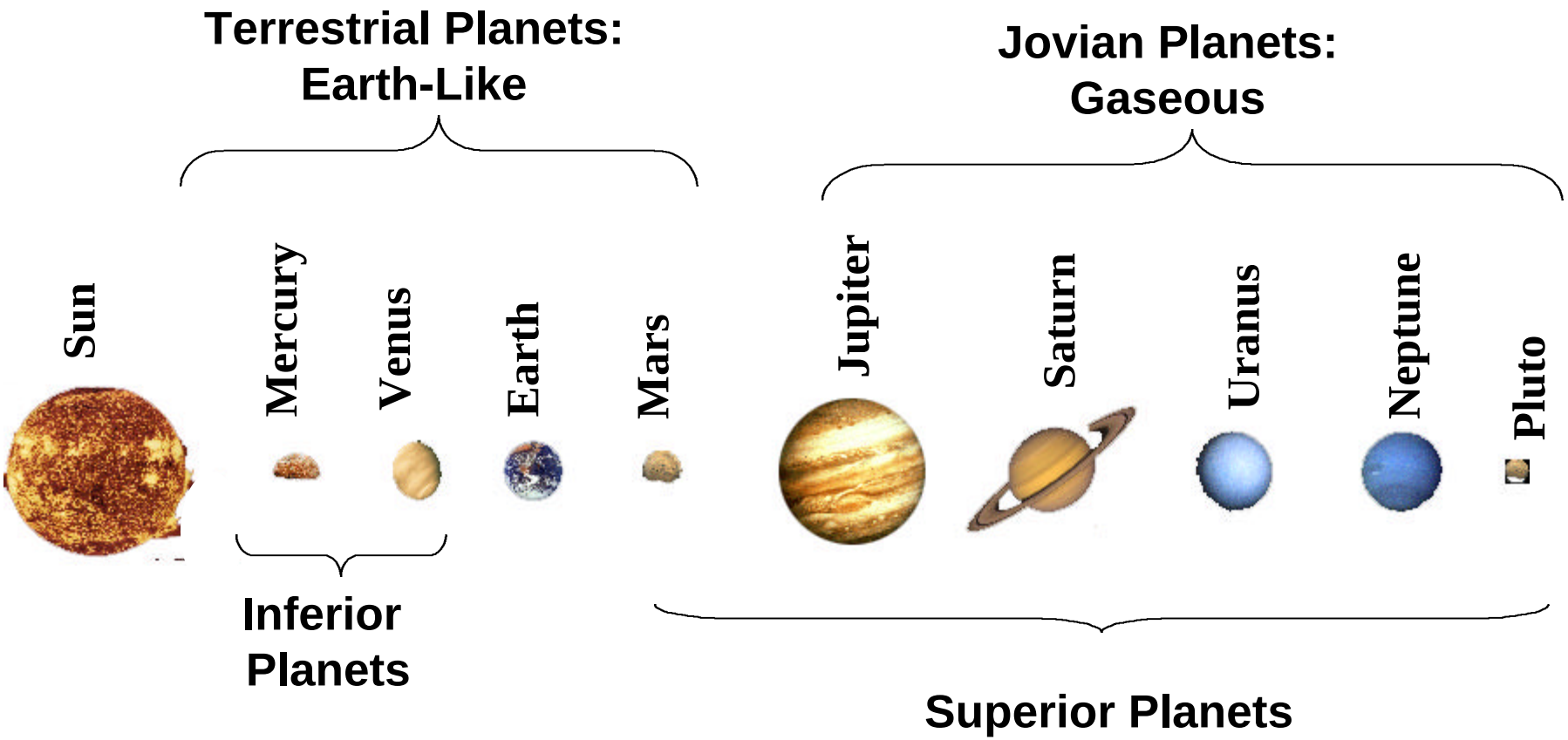
Planets

Chapter 5

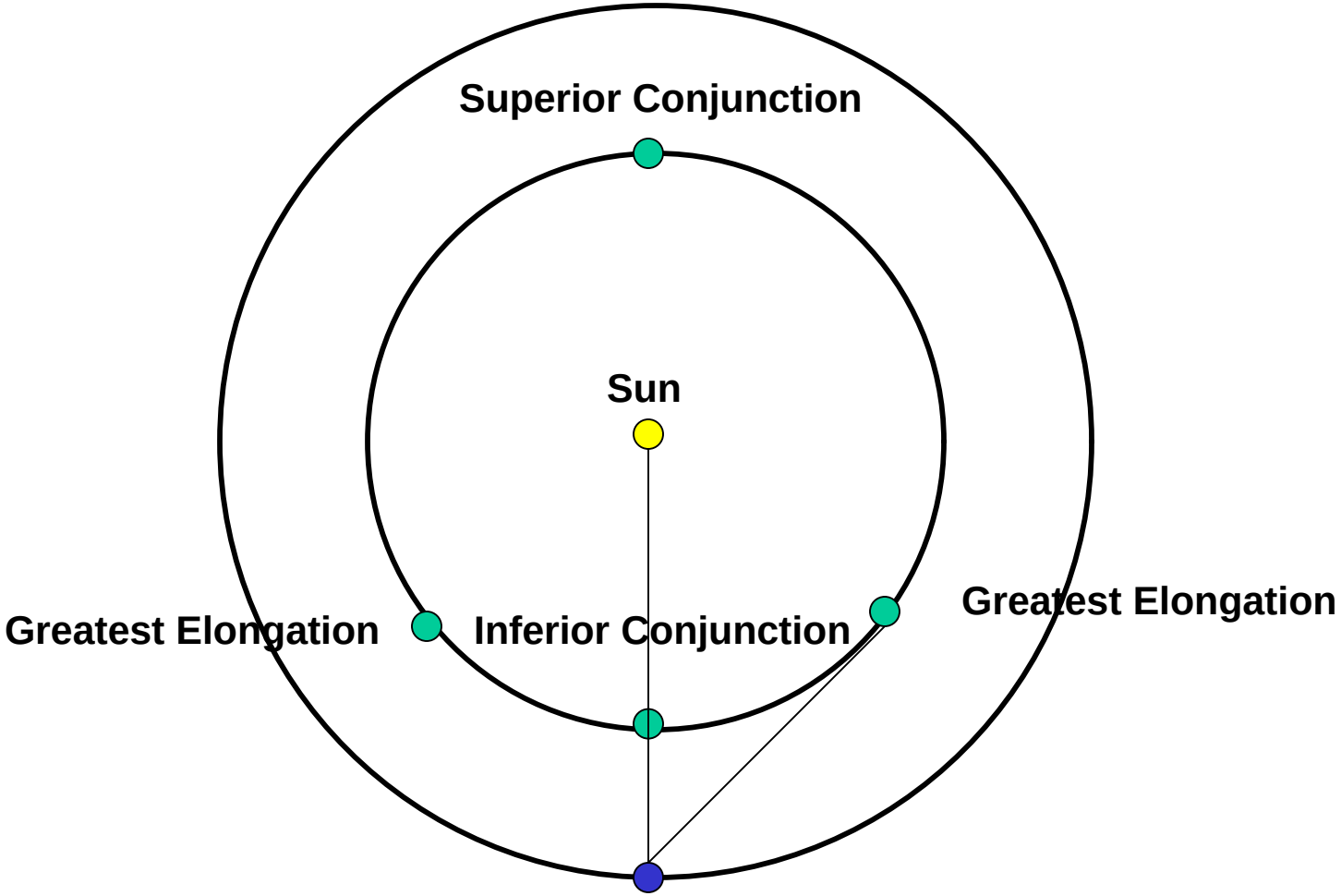
The Solar System



<u>Inferior Planets</u> - Exhibit Phases from Earth

<u>Orbital Aspect</u> - Angle between planet, Sun and Earth

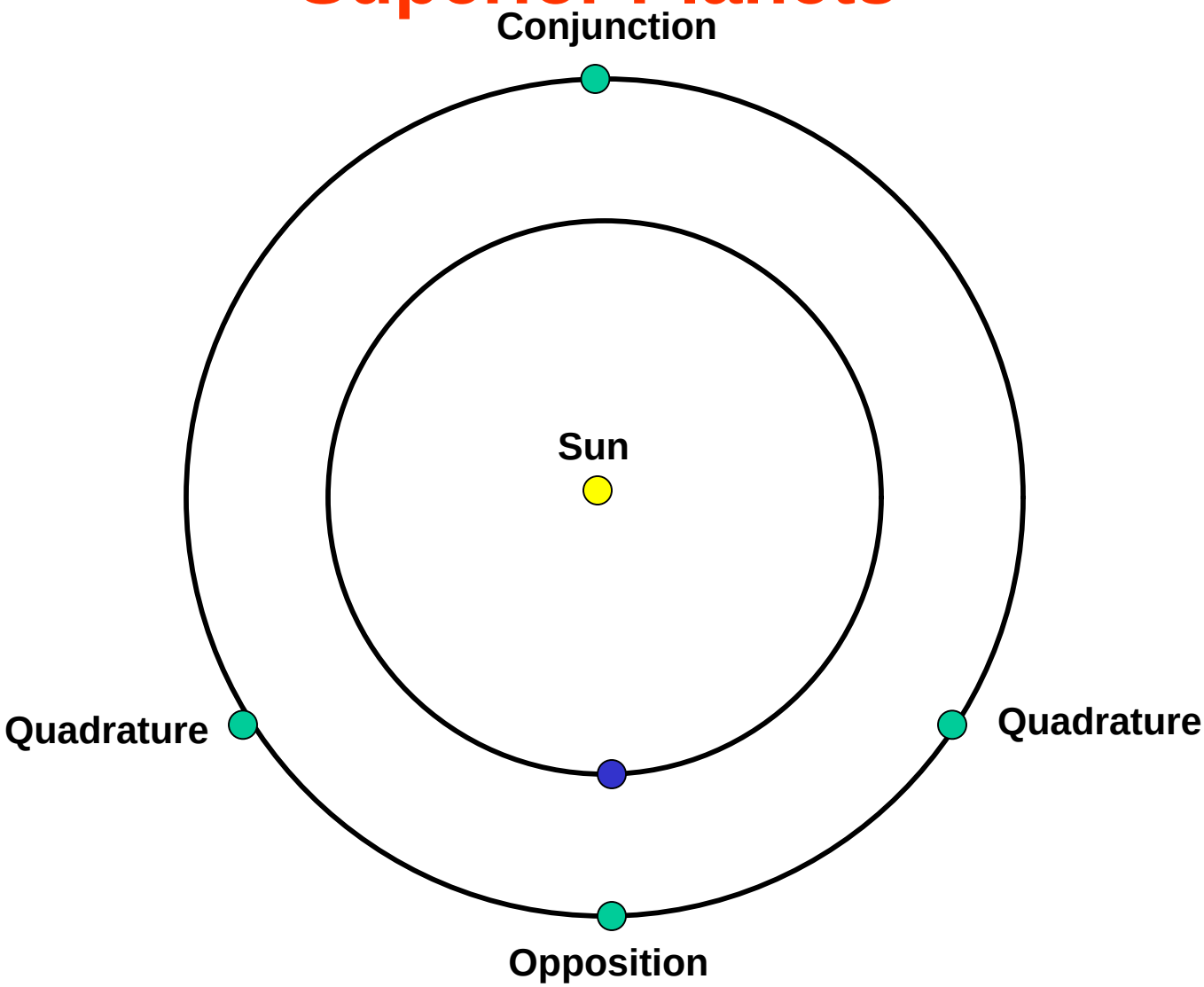
Orbital Aspects
Inferior Planets



Best orbital aspect for viewing = greatest elongation

Mercury = 14°-28°; Venus = 47°

Orbital Aspects
Superior Planets



Best orbital aspect for viewing = opposition

Mercury

- **Orbital Information and Brightness**
  - **Period of revolution = 88 days**
  - **Period of rotation = 49 days**
  - **Apparent magnitude = 0**
  - **Distance = 0.39 A.U.**
- **Mercury is a terrestrial planet with no atmosphere**
  - **Temperature: -170° C to 350° C**
  - **Covered with craters formed by meteor impacts**
- **Observing Mercury**
  - **Difficult with Earth based telescopes**
  - **Resolve the planet into a disc with a 4-6” telescope**
  - **Planet visited by the Mariner spacecraft**

Venus

- **Orbital Information and Brightness**
  - **Period of revolution = 243 days**
  - **Period of rotation = 224 days**
  - **Apparent magnitudes = -4.4**
  - **Distance = 0.72 A.U.**
- **Venus is a terrestrial planet with a thick atmosphere**
  - **Covered with sulfuric acid clouds; atmosphere = CO_2**
  - **Temperature = 480° C; Pressure = 90X Earth**
  - **Large valleys, plateaus with a soil/rocky surface**
- **Observing Venus**
  - **Cannot see surface features (hidden by clouds)**
  - **See phase with a 2” aperture telescope**
  - **Spacecraft: Mariner, Magellan, and Venera**

Mars

- **Orbital Information and Brightness**
  - **Period of revolution = 1.88 years**
  - **Period of rotation = 24.5 hours**
  - **Apparent magnitude = -2.0**
  - **Distance = 1.52 A.U.**
- **Mars is a terrestrial planet with a thin atmosphere**
  - **Thin CO_2 atmosphere; pressure = 1% Earth's pressure**
  - **Polar cap; large valleys, large volcanoes**
  - **2 moons; Phobos and Deimos**
- **Observing Mars**
  - **2" aperture telescope resolved the planet into a disc**
  - **6-8": dark markings on surface and polar cap**
- **Spacecraft: Mariner, Viking, Pathfinder, Mars Orbiter**

Jupiter

- **Orbital Information and Brightness**
  - **Period of revolution = 12 years**
  - **Period of rotation = 10 hours**
  - **Apparent magnitude = -2.7**
  - **Distance = 5.2 A.U.**
- **Jupiter is a Gaseous planet with a complex atmosphere**
  - **Atmosphere: H, He and many other gases**
  - **Large storms in upper atmosphere**
  - **28 moons; major moons: Io, Europa, Ganymede, Callisto**
- **Observing Jupiter**
  - **2” aperture telescope: bands and moons**
  - **6-8”: several bands, red spot, 4 moons**
- **Spacecraft: Pioneer, Voyager 1 & 2, and Galileo**

Saturn

- **Orbital Information and Brightness**
  - **Period of revolution = 29 years**
  - **Period of rotation = 10 hours**
  - **Apparent magnitude = 0**
  - **Distance = 9.55 A.U.**
- **Saturn is a Gaseous planet with a complex atmosphere**
  - **Atmosphere: H, He and many other gases**
  - **Major rings system with gaps (Cassini and Encke)**
  - **Rings composed of small “dirty snowballs”**
  - **30 moons; major moons: Titan, Rhea, Dione, Tethys**
- **Observing Saturn**
  - **2” aperture telescope: resolve the rings**
  - **6-8”: rings, Cassini’s division, major moons**
- **Spacecraft: Pioneer and Voyager 1 & 2**

Uranus

- **Orbital Information and Brightness**
  - **Period of revolution = 84 years**
  - **Period of rotation = 17 hours**
  - **Apparent magnitude = 5.5**
  - **Distance = 19.2 A.U.**
  - **Uranus is inclined 98° with respect to Sun**
- **Uranus is a Gaseous planet with a complex atmosphere**
  - **Complex ring structure**
  - **Abundance of methane in atmosphere**
  - **21 Moons**
- **Observing Uranus**
  - **2” aperture telescope: resolve planet into disc**
  - **16”+: some bands may be visible**
- **Spacecraft: Voyager 2**

Neptune

- **Orbital Information and Brightness**
  - **Period of revolution = 164 years**
  - **Period of rotation = 16 hours**
  - **Apparent magnitude = 8**
  - **Distance = 30 A.U.**
  - **Discovered by observing small deviations in Uranus' orbit**
- **Neptune is a Gaseous planet with a complex atmosphere**
  - **Complex ring structure**
  - **Abundance of methane in atmosphere**
  - **8 Moons**
- **Observing Uranus**
  - **8" aperture telescope to resolve into disc**
- **Spacecraft: Voyager 2**

Pluto

- **Orbital Information and Brightness**
  - **Period of revolution = 248 years**
  - **Period of rotation = 6.4 hours**
  - **Apparent magnitude = 14**
  - **Distance = 39 A.U.**
  - **Discovered by observing small deviations in Neptune's orbit**
- **Pluto is a small frozen terrestrial planet**
- **Observing Pluto**
  - **Need a 12" aperture telescope to see the planet**
- **Moon: Charon**

Other Members of our Solar System

- **Asteroids (Minor Planets)**
- **Meteoroids**
  - **Meteor - Meteoroid burning in the atmosphere**
  - **Meteorite - Meteoroid found here on Earth**
- **Comets: Long period (<200 y.) and short period (1-30 million y.)**

  - Oort Cloud - Distant (.5 pc), 10^{12} LPC

  - Kuiper Belt - SPC at about 40 AU, about 35,000

Planets
The Student's Responsibility

- **Understand the observational detail of the planets**
  - **Major features**
  - **Focus is on observation technique**
- **Orbital Aspects**
  - **Superior planets**
  - **Inferior planets**