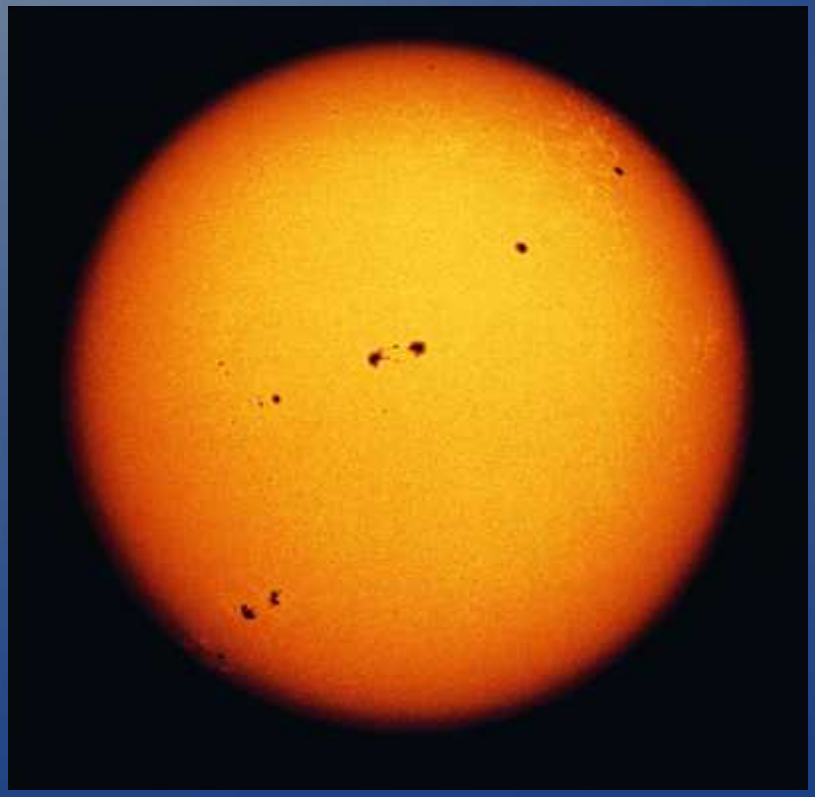
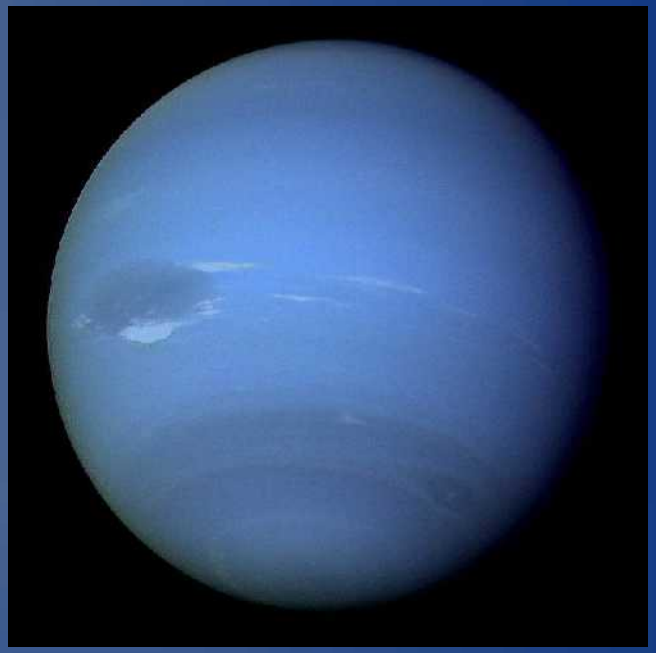
Our Place in the Universe

Star

A large, glowing ball of gas that generates heat and light through nuclear fusion



Planet



A moderately large object which orbits a star; it shines by reflected light. Planets may be rocky, icy, or gaseous in composition.

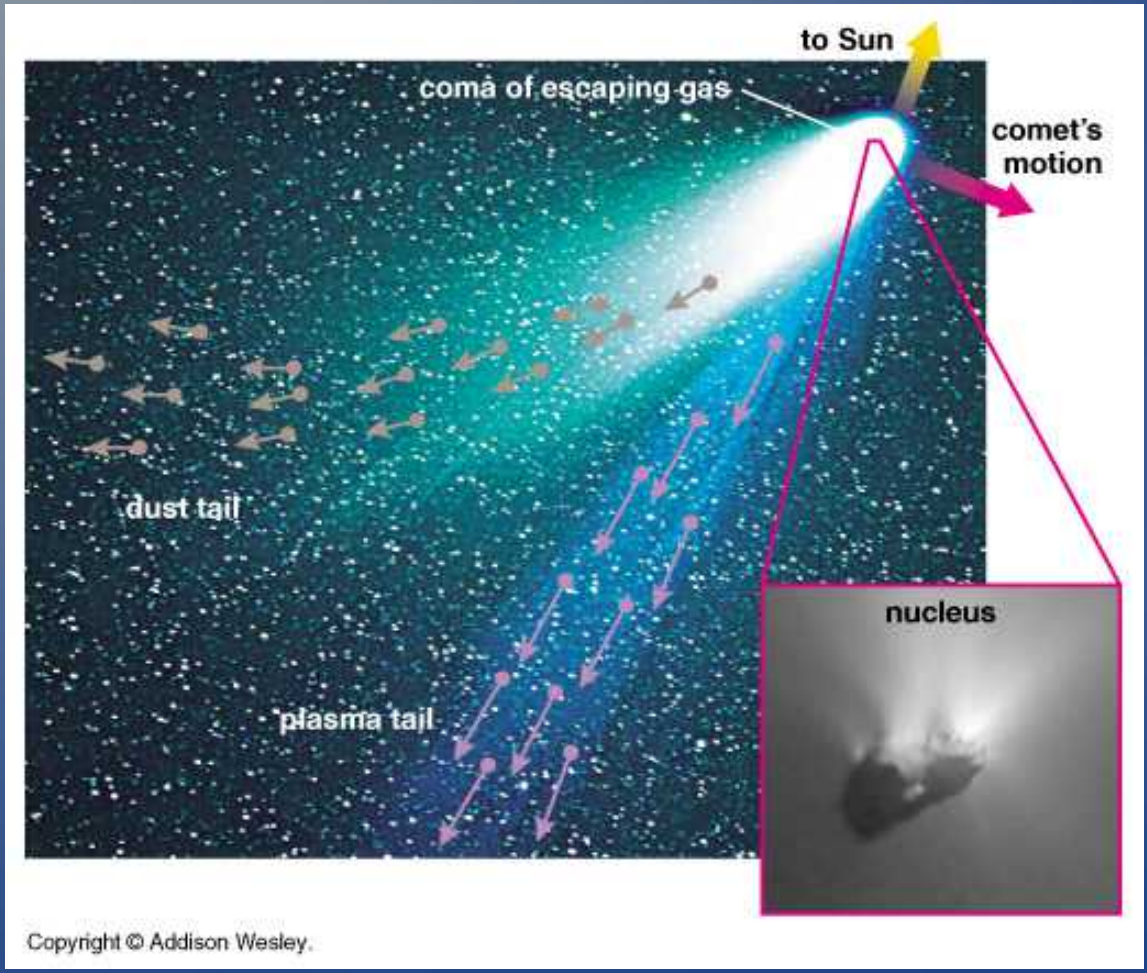
Moon

An object which orbits a planet.

Asteroid

A relatively small and rocky object which orbits a star.

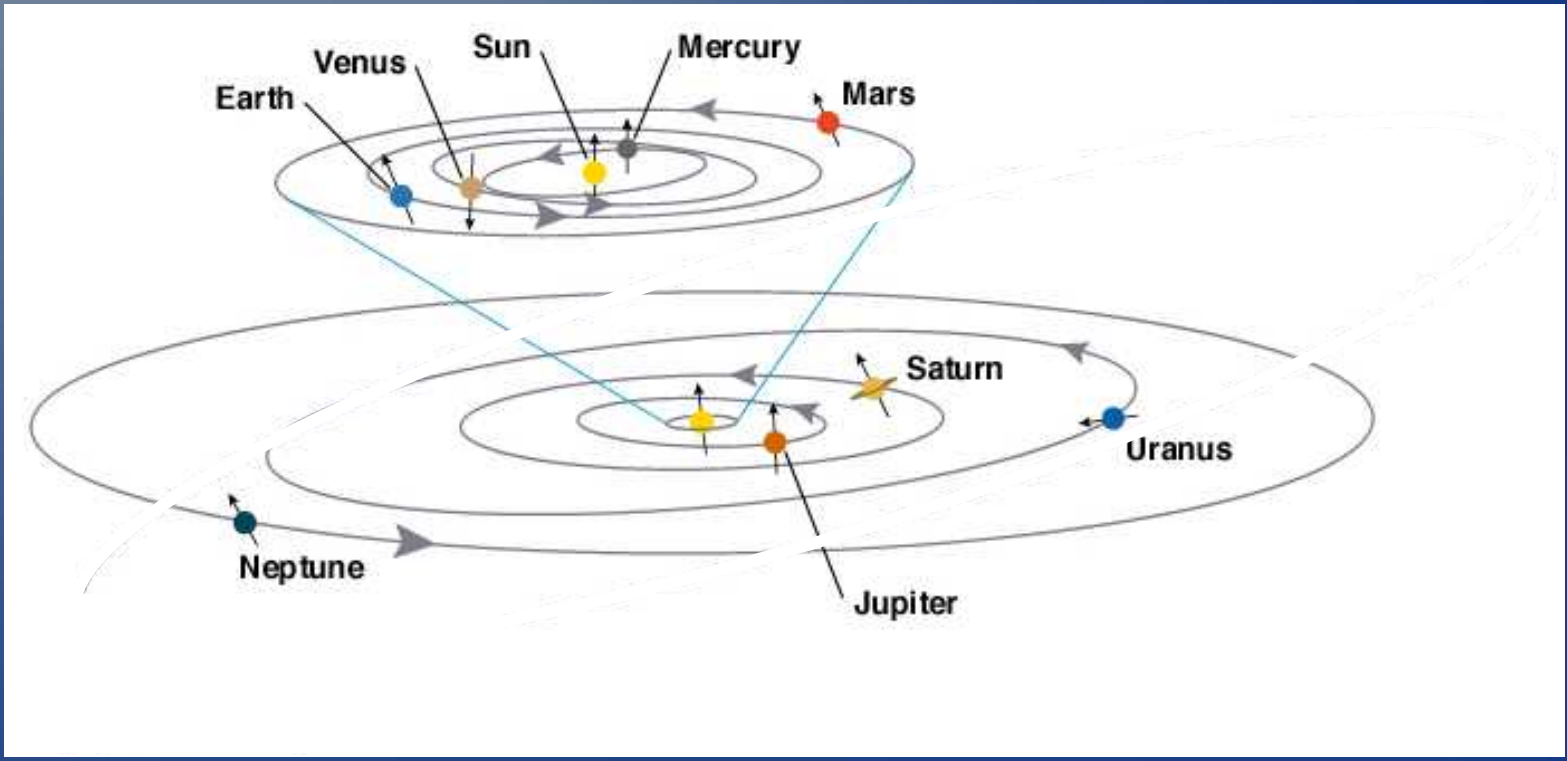
Comet



A relatively small and icy object which orbits a star.

Solar (Star) System

A star and all the material which orbits it, including its planets and moons

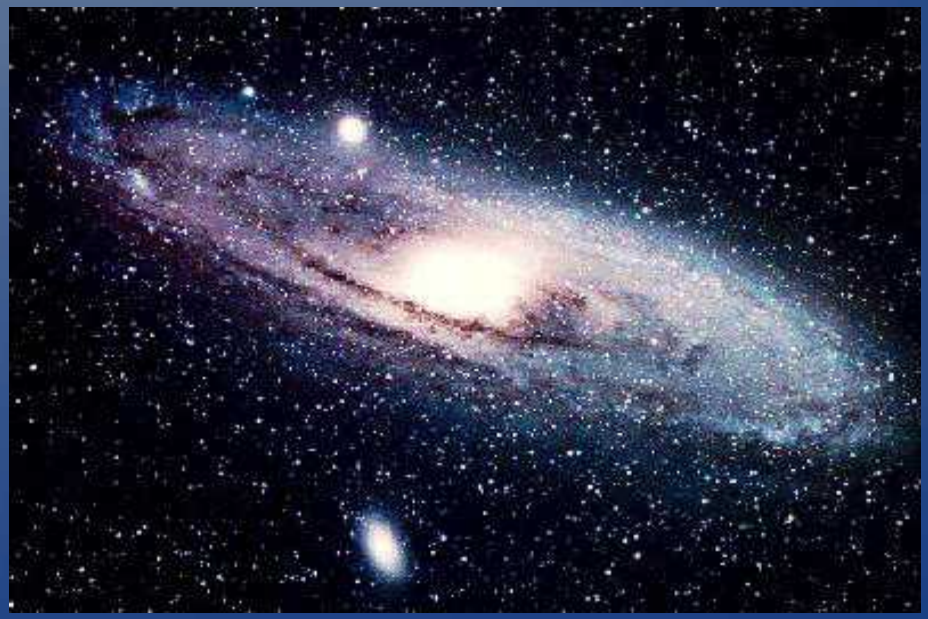


Nebula

An interstellar cloud of gas and/or dust

Galaxy

A great island of stars in space, all held together by gravity and orbiting a common center

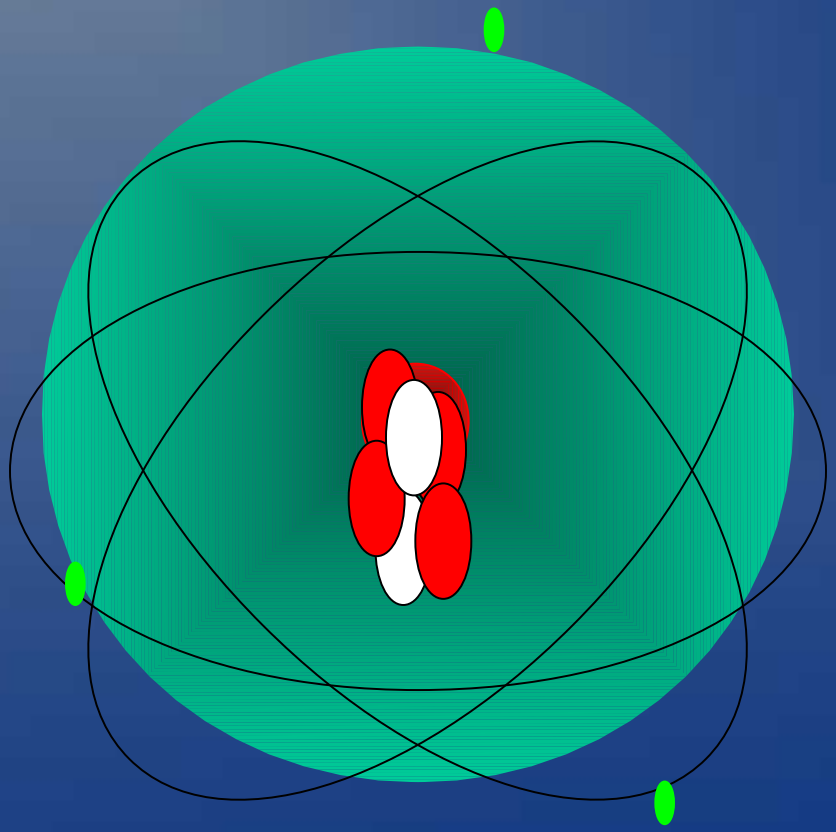


Universe

The sum total of all matter and energy; that is, everything within and between all galaxies

Atom

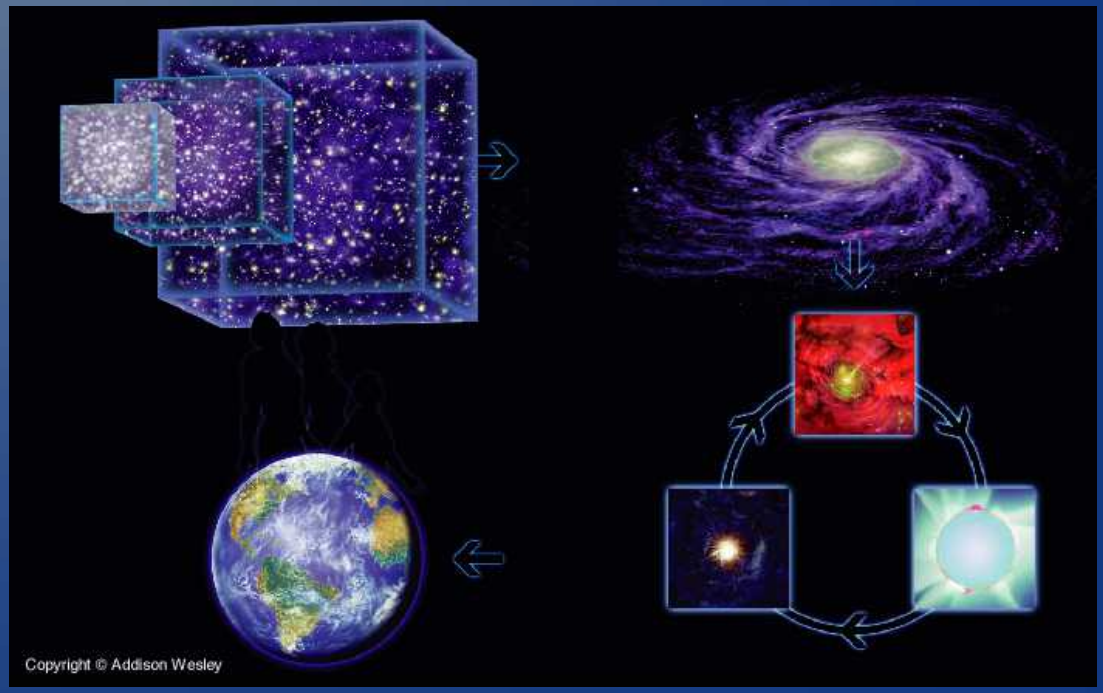
Microscopic “building blocks” of all chemical elements



Where do we come from?

- The first (and simplest) atoms were created during the **Big Bang**.
- More complex atoms were created in stars.
- When the star dies, they are expelled into space…. to form new stars and planets!

Most of the atoms in our bodies were created in the core of a star!



What do we see when we look up?

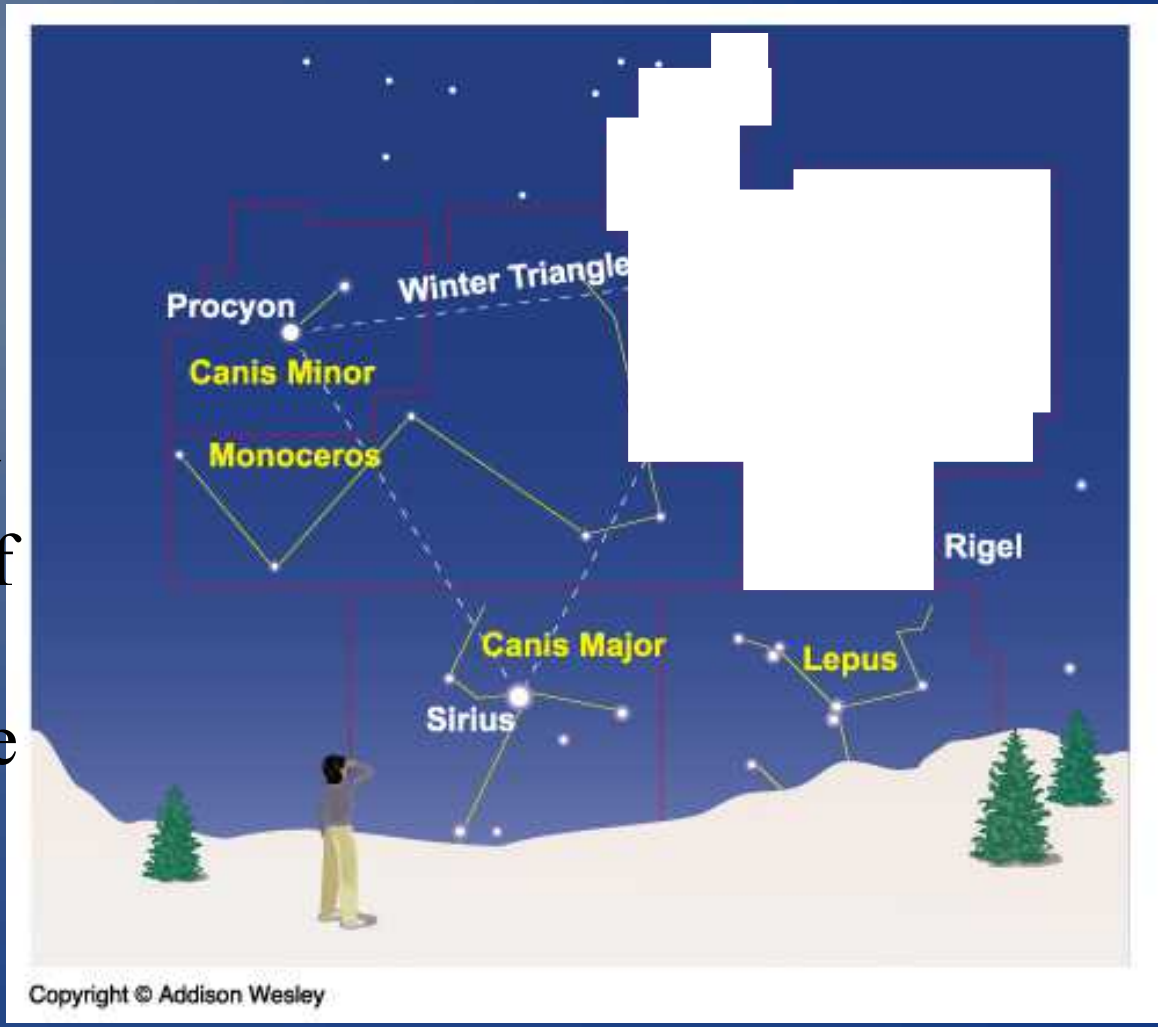
- Patterns in the Sky

1. Motions in the Sky
2. The Circling Sky
   - > the rotation of the Earth about its axis — *day*
3. The Reason for Seasons
   - > the Earth's orbit around the Sun — *year*
4. Precession of the Earth's Axis
   - > the wobbling of Earth's axis
5. The Moon, Our Constant Companion
   - > the Moon's orbit around the Earth — *month*
6. The Ancient Mystery of the Planets
   - > the various planets' orbits around the Sun — *week*

A Constellation is…

… a *region* of the sky, within official borders set in 1928 by the IAU.

- Often recognizable by a pattern or grouping of stars.
- Some patterns, like the Winter Triangle, span several constellations.



Thought Question

The brightest stars in a constellation…

- all belong to the same star cluster.
- all lie at about the same distance from Earth.
- may actually be quite far away from each other.

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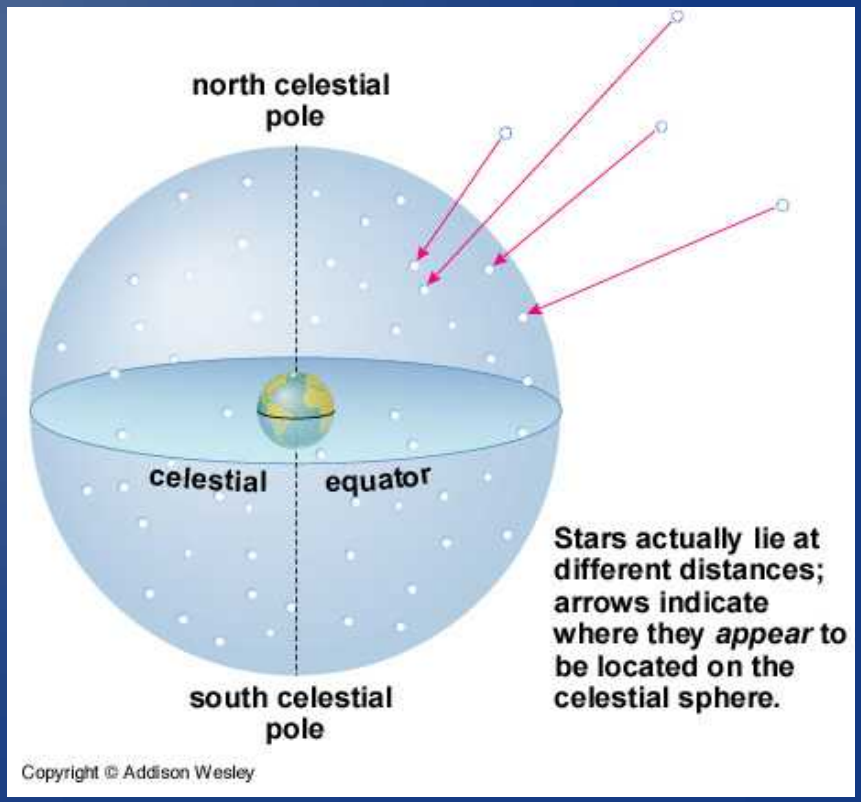
Constellations

- Most official constellation names come from antiquity. Some southern hemisphere constellations were named by European explorers in the 17th & 18th centuries.
- The patterns of stars have no physical significance! Stars that appear close together may lie at very different distances.

- Most modern astronomers don't know many!!



Looking back in time

- Light, although fast, travels at a finite speed.
- It takes:
  - 8 minutes to reach us from the Sun
  - 8 years to reach us from Sirius (8 light-years away)
  - 1,500 years to reach us from the Orion Nebula
- The farther out we look into the Universe, the farther back in time we see!