Name: _____ **Study Guide**

Topic: Astronomy

The Universe

Biggest to smallest

Universe, Galaxy, Solar System, Sun, Planet, Moon

Origin of the Universe

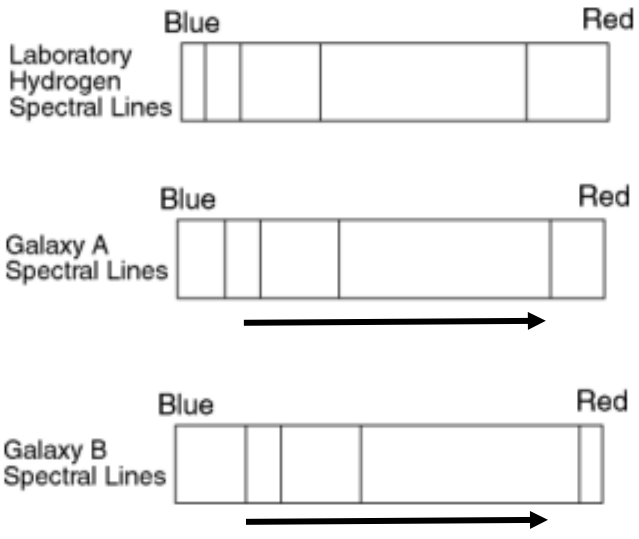
- **Big Bang:** theory that a giant "explosion" some 13.8 billion years ago created the universe, and that it has been expanding from this explosion ever since.
- Evidence of the Big Bang Theory:
  - **Cosmic background radiation**: can still be detected (in all directions) from the original big bang
  - **Stellar radiation**: star light is affected by a star's motion.
    - **Doppler Effect:** shift in light/ sound waves as the source moves either toward or away from the observer.

Red Shift: waves are spread out when object is moving ***away*** from the observer

Blue Shift: waves are compressed when object is moving ***toward*** the observer

Spectra of galaxies shows a shift toward the **Red end** of the spectrum due to the Doppler Effect.

This means most galaxies are moving **AWAY** from Earth.



Stars

- **Galaxies:** billions of stars
  - Shapes include spiral, elliptical, and irregular
  - There are billions of galaxies in the universe

Classifying Stars

- Stars are grouped by comparing their **luminosity** to their **temperature**. Check out page 15 in the ESRT
- Star Types:
  - **Main Sequence Stars**: the diagonal band across the star graph where most plotted stars are found
  - **Giant Stars**: bigger, brighter stars that are older than the main sequence stars
  - **Super Giants:** 100 to 1000 time the diameter of the sun
  - **White Dwarfs:** old stars that have collapsed, making them very small, very dense, and very hot

Life Cycle of a Star

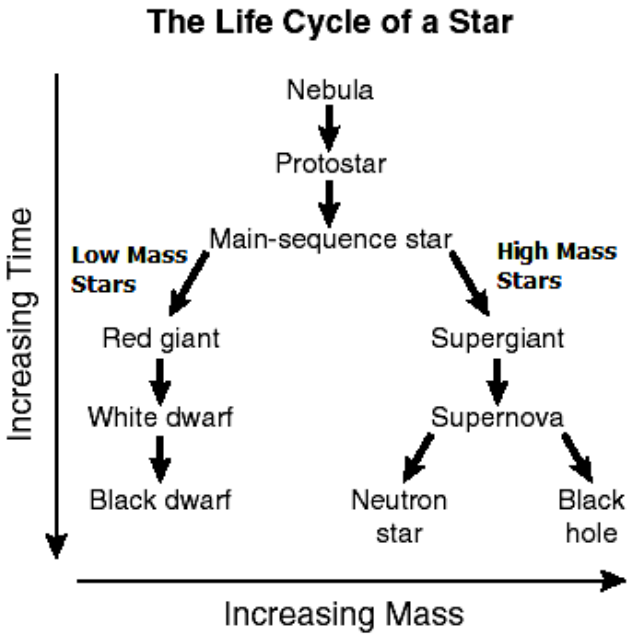
1. Stars originate from clouds of dust and gas molecules, known as a **nebula**.
2. Gravity caused the dust and gas to clump together forming a **protostar**.
3. Inside the core:
   - Temperature, gas pressure, and density increases as atom collisions increase.
   - Nuclear fusion starts!
     - **Nuclear fusion:** the process of stars making energy by combining hydrogen atoms to make helium.

HAPPY LIFE

1. Equilibrium between gravity and heat and pressure from fusion must be kept in order for a star to live peacefully.
2. A star will live happily as long as it continues to burn hydrogen.

DEATH OF A STAR

1. Gravity, heat and pressure are no longer in equilibrium.
2. What happens after this point depends on the mass of the original star. Look at the chart →



Solar System

- **Solar System:** the sun and all objects that orbit the sun under its gravitational influence.

- The **Solar System formed about 4.6 billion years ago** from dust/ gas cloud pulled together by gravity.

Gravity: influences the motion of celestial objects

- Gravity is directly proportional to an object's mass.
    - **The higher the mass of a planet, the more gravitational pull it has**
- Gravity is indirectly proportional to an object's distance
    - **The farther two objects are away from each other, the less gravity between them.**

Asteroids, comets, and meteors

- **Asteroids:** a solid rock/ metallic bodies that orbit around the sun.
    - Found between Mars and Jupiter.

- **Comets:** objects composed of rock and ice that easily vaporize
    - Comets move around the sun.

- **Meteors:** path of light from meteoroid burning as it passes through Earth's atmosphere; also called a shooting star.
    - Impact events have been correlated with mass extinction and global climate change.