TWINKLE TWINKLE LITTLE
STAR HOW I WONDER
WHAT YOU ARE.
WHAT'S THE DIFFERENCE BETWEEN STARS AND OTHER SPACE OBJECTS?
WHAT ARE STARS?

- A star is a huge sphere of very hot, glowing gas.
- Stars produce their own light and energy by a process called nuclear fusion. Fusion happens when lighter elements are forced to become heavier elements.
- They’re different than other objects in space because they give off light.
STELLAR EVOLUTION

- Stars live for a very long time compared to human lifetimes. Even though stellar life-spans are enormous, we know how stars are born, live, and die. All stars follow the same basic series of steps!
NEBULA STAGE 1
STARS
BIRTHPLACE!

• A star begins as a nebula which is a cloud of gas and dust.

• 70% H, 28% He, 2% heavier elements

• Gravity causes smaller particles to collide and create larger particles with greater gravitational pull.

• The nebula shrinks and spins faster.
ADDITIONAL FACTS

- Nebulas can create more than one star.
- Often two stars are produced that revolve around each other.
- They also may produce single stars w/planetary bodies. (Sound familiar ?)
STAGE 2
PROTOSTAR

• Spinning nebula flattens into a disc with a dense central concentration called a **protostar**.

• As more material collects and condenses due to gravity the temp of the protostar increases. This process continues over millions of years. It becomes so hot the gas is converted to plasma.
The process continues until it reaches ~ 10,000,000 °C. At this temperature, nuclear fusion will begin.

This is the point where it officially becomes a star and enters into its main sequence stage.
MAIN SEQUENCE CONT. STAGE 3

- Main Sequence Stars:

- The second and the longest stage in the life of a star.

- H is fused to become He. 1g of H can light a light bulb for 3000 years.
**RED GIANTS/ SUPER GIANTS**

- Fourth stage.
- When nearly all H has been fused to form He.
- W/o H fusion the star begins to contract due to gravity. The contraction causes the core to become hotter.
- Increase temps leads to fusion of He to C. Also the remaining H continue to fuse.
STAGE 5 SUN-LIKE STAR

- A star with the same mass as the sun never becomes hot enough to go supernova.
- The outer layers expand causing a planetary nebula.
- The remaining carbon core is called a white dwarf.
WHITE DWARF STAR

- A white dwarf gradually cools, eventually losing its luminosity and becoming an undetectable black dwarf star!
The creator of heavy elements: the supergiant star.

Theses stars need to be 8 to 20 times as massive as the sun in order to accomplish this.
SUPERNova!
SUPERNOVA

• The violent ending of a massive stars life cycle

• Once iron has been created in no further nuclear reactions can occur.

• Thus the core violently collapses and leaves behind a neutron star or black hole.

• The shockwaves send huge amount of energy and richen the universe with heavy elements.
BLACK HOLE

- A star with more than 20 times the mass of the sun will end up as a black hole.
- Gravity is so great nothing can escape not even light.
GRAVITY VS. PRESSURE

- There more massive a star the greater the gravity, but also the more fusion that occurs.
- This is called hydrostatic equilibrium.