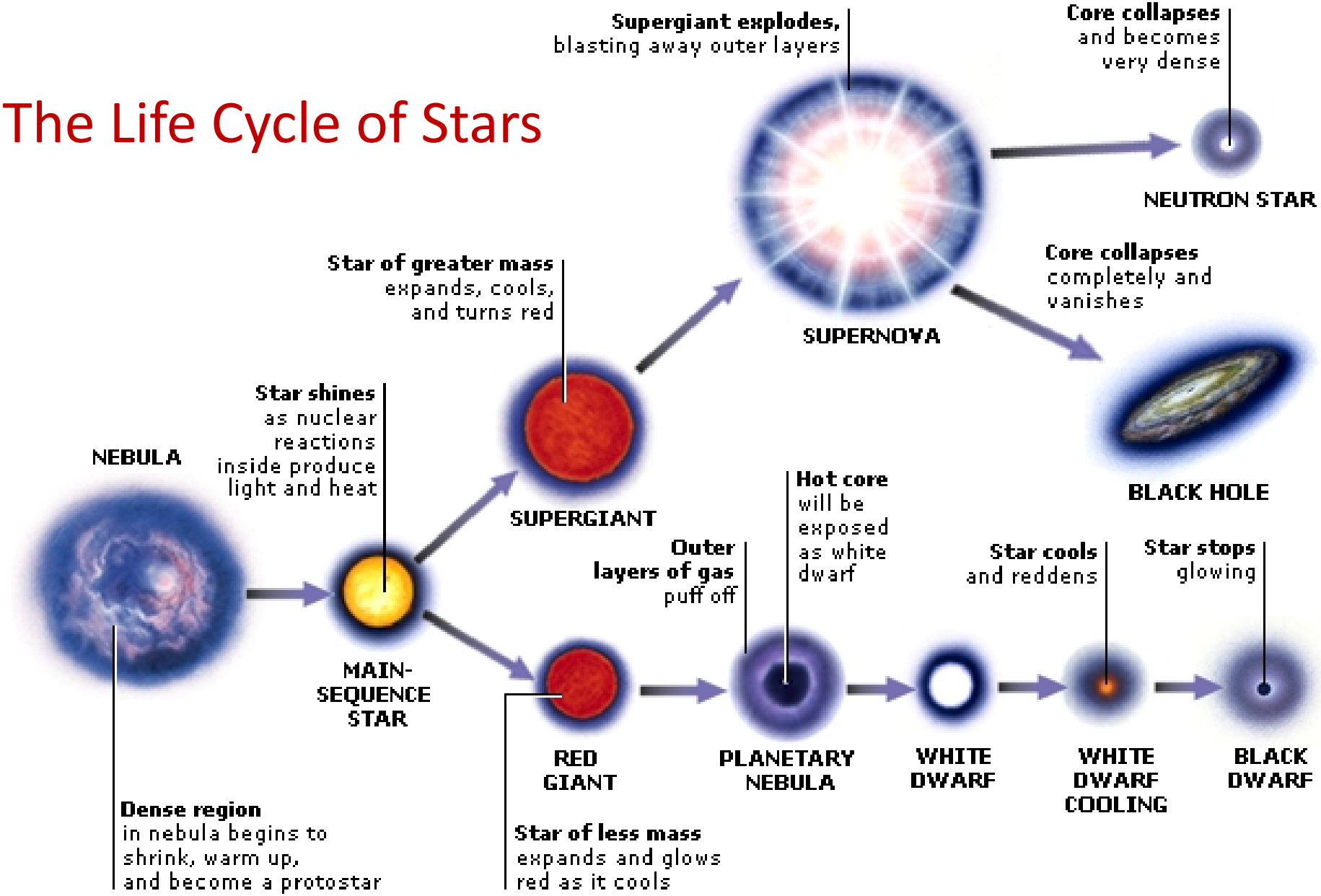
The Life Cycle of Stars



THE BEGINNING(Birth of a star):

Stars are first formed in a cloud of gas and dust called a nebula.

The BEGINNING (Birth of a star)

- A **protostar** forms when the cloud contracts to become so dense and hot that fusion begins.

Stage 1: Star formation

- A star is born when the temperature in a protostar increases until 10,000,000 degrees Celsius and nuclear fusion begins.

Stage 2: The Main-Sequence Stage (Adulthood)

- This is the longest stage in a star's life.
- Stars stay stable in size because of a balance between forces of **radiation** and **gravity**.
- A stars **mass** determines its place on the main sequence and how long it will stay stable.
- A star the size of our sun stays on the main-sequence for approximately 10 billion years.
- More massive stars fuse hydrogen more rapidly, so they only stay for 10 million years.

com/watch?v=HEheh1B

Masses and Sizes of Stars

- Most stars are smaller and less massive than the sun.
- **The sun is a medium-sized main sequence star like most of the stars you see in the sky.**
- **Our sun is a "yellow" star and has about 5 billion years left before it starts to die as a red giant.**

Stage 3: Leaving main sequence

- A star will begin to die as it runs out of **hydrogen** for fusion.
- Leaves when 20% of the hydrogen have fused into helium.

- The outer shell of the star expands to form a **giant** (for a sun-like star) or a **supergiant** (for more massive stars).

Giants and Supergiants

- A red giant grows from a low or medium mass star.
- A red supergiant grows from a high mass star.
- Giants are typically 10 times bigger than the sun while supergiant's are often 100 times bigger than our sun.

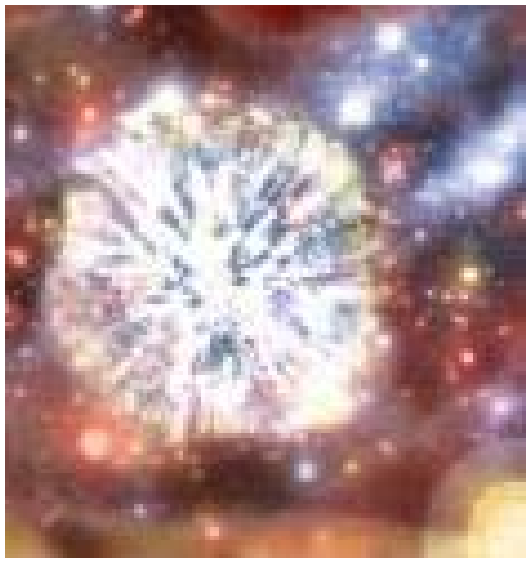
White dwarf stars
(Low/Medium mass Star Death)

- After all the hydrogen fuel has been used up, a star can become a white dwarf that no longer emits energy from fusion.
- On the way to becoming a white dwarf, a giant star might go through the planetary nebula stage.

- Planetary nebula: a cloud of gas that forms around a sunlike star that is dying.
- When a white dwarf cools completely, it becomes a black dwarf.

Final Stages in more massive stars

- A more massive star will end it's main sequence stage by becoming a supernova, a star that has a tremendous explosion that blows itself apart.



Neutron Stars and Black Holes (High-Mass Star Death)

- After a supernova, a supergiant will turn into either a neutron star or black hole.

Neutron Star
(High Mass Star Death)

- After a star explodes as a supernova, the core contracts into a very small but incredibly dense ball of neutrons, called a neutron star.

- A single teaspoon of matter from a neutron star would have the mass of 2×10^{30}Kg

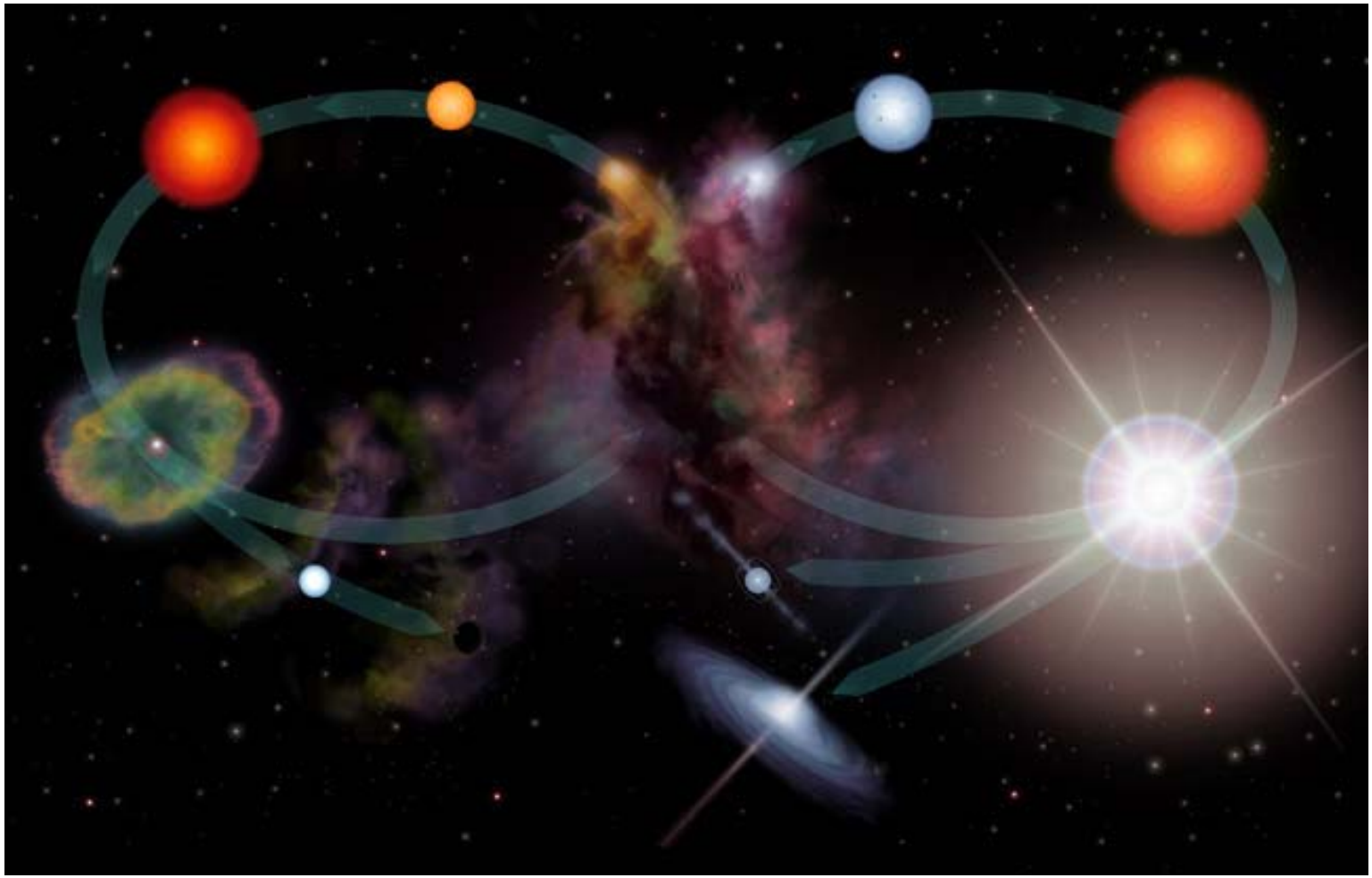
- Neutron stars rotate rapidly. If they emit pulses of radio and optical energy they are called pulsars.

Black Holes
(High Mass Star Death)

- If the remaining core of a star contains more than 3 times the mass of the sun, the star may contract further under its greater gravity. The force of the contraction crushes the dense core of the star and leaves a black hole.
- The most dense massive objects in the universe are called black holes.
- They have so much gravity that even light can’t escape.

Final Stages in more massive stars

Life Cycle of Stars



http://hea-www.cfa.harvard.edu/CHAMP/EDUCATION/PUBLIC/ICONS/life_cycles.jpg

30 pt Formative

- Constellation Name and Boundary
  Dates and Time of when constellation is best viewed from Florida
- Brief history of this constellation
- Ten Brightest Stars in the constellation and Stellar Proper
- A depiction of your constellation on black paper with silver sharpie