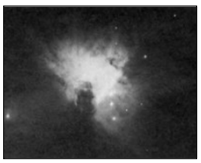
The Star Cycle

1

Nebula(e)

- Large cloud of _____ (~ 25 LY in diameter)
- 99% Hydrogen (H) and 1 % dust particles
- Most are invisible
- Visible when
  - Reflect light from a nearby star (diffuse nebula)
  - Block light from stars behind it (dark nebula)
- Enough material to produce many stars



Great Nebula

Horsehead Nebula

2

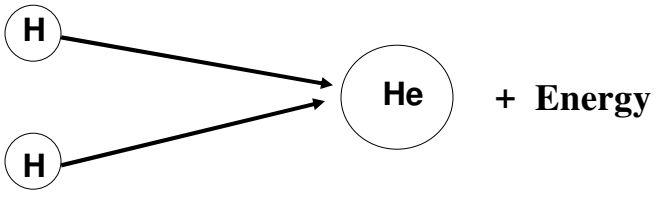
Contraction

- Outside force causes the gas and dust to _____, possibly from an exploding star (supernova)
- Gravity continues the contraction of the gas and dust
- Particles gather, producing denser patches in the cloud
- As the cloud contracts, temperature _____ causing it to glow when hot enough (protostar)

3

A Star is Born

- Protostars continue to contract, getting hotter and brighter
- When the center gets hot enough, ignition begins and a star is born (_____ begins)



4

Stable State

- Last for millions or billions of years
- Force of _____ equals the outward push of _____
- _____ massive stars (blue or white) take a few thousand years to form
- _____ massive stars (yellow or orange) take millions of years to form because they contract more slowly

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Balancing Act Ends

- Too much _____ is used, decreasing the energy released allowing the star to contract
- Contraction heats core, causing outer layers to expand
- Expansion causes star to appear larger, and brighter (Red Giant or Super Giant)
- Core hot enough to fuse all hydrogen into helium, fusion continues creating oxygen, carbon, etc.

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Fading of the Star

- Fuel is all used up causing the outer layers to collapse creating a _____
- With very little fuel left, the white dwarf glows faintly for around a billion years
- Burns all of the remaining fuel, becomes cold and dark

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One Last Hoorah

- Occasionally, a white dwarf will become a thousand to a million times brighter for a few years
- Scientist call this a _____, possibly caused by a collision with a companion star

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Death of a Big Star

- Fusion _____ , leaving iron in the core
- Star cools and core collapses
- Collapse causes an increase in _____ , causing the iron to fuse into heavier elements.
- Rapid collapse causes the star to explode (_____)
- Half the mass is blown away forming a cloud
- Star brightens the sky for a few weeks or months

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Death of a Big Star (cont.)

- The remaining half of the star becomes a _____
  - The electrons are crushed and combined with protons to produce a dense mass of neutrons
  - Stars are about 10 km in diameter and a trillions times more dense than the sun
- In _____ stars, gravitational forces cause the star to collapse into a _____

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Black Holes

- Gravitational force is so strong not even _____ can escape
- Usually discovered by detecting strong x-ray emission
- Can also be identified by a star orbiting an “invisible” companion
- Matter from the star is drawn into the black hole
- Before entering the black hole the atoms of the star are ripped apart emitting the x-rays

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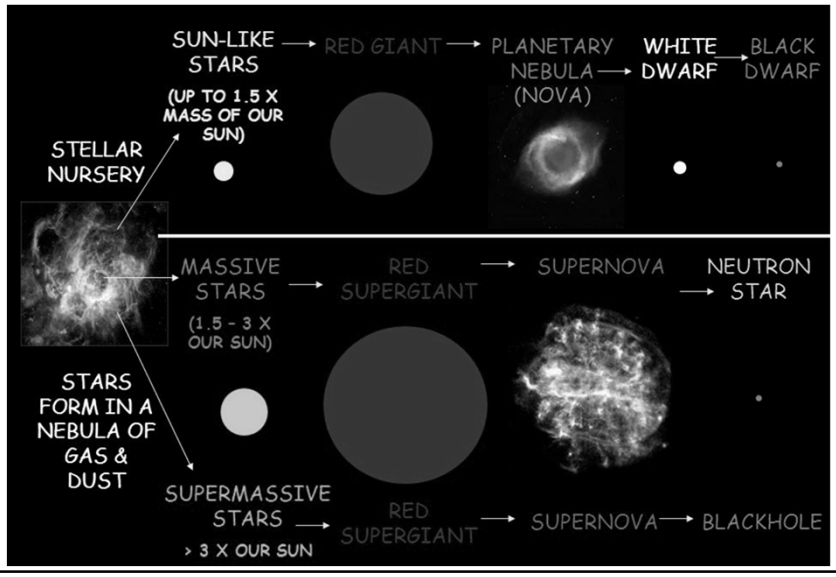
Star Life Cycle



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