

## Life Cycle of a Star Mobile

One star, two star, red star, white dwarf star! Throughout its billion-year life, a low-density star, just like our Sun, goes through many changes. Learn about the different stages in a star's life cycle, and make your own star mobile!

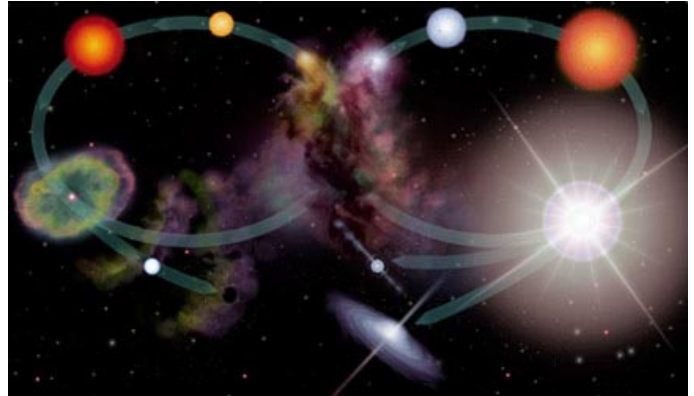


Photo credit NASA

### The Life of a Star

A star's life cycle is determined by how big it is, or how much mass it has! The greater the mass of the star, the shorter its life. Depending on the amount of matter in the nebula where the star is born, it will either be a high-mass star, or a low-mass star, like our Sun. We'll use this life cycle for our mobile.

But how are stars formed, anyway? As clouds of gas and dust move around in a nebula, hydrogen gas is pulled together by gravity and begins to spin faster and faster, heating up to become a protostar. When hot enough (about 15,000,000 degrees Fahrenheit!), a reaction called nuclear fusion occurs at the star's core, pulling in more gas and dust and causing the star to stabilize and glow bright! It will continue shining in this phase as a main sequence star for millions to billions of years. Our closest star, the Sun, is currently at this stage.

Over time, hydrogen at the star's core is converted to helium through nuclear fusion. Once the hydrogen runs out, the star isn't able to generate enough heat to maintain its size. The core contracts, while the outer shell expands and cools, glowing red. This is known as the red giant phase. As the core continues to cool, the helium begins to fuse into carbon. Once all the helium is gone, the core collapses, and the outer layer is expelled into gases and dust, creating a planetary nebula! The collapsed core remains as a white dwarf, slowly cooling to become a black dwarf.

A high-mass star undergoes a supernova explosion after its red giant phase. If the explosion is small, it becomes a neutron star. But if the explosion is large, the core of the star is swallowed by its own gravity, becoming a black hole!

## Supplies:

- Paper Plate
- Colorful beads, pom-poms, sequins, colored paper, cotton balls, pillow stuffing, etc.
- Paints, markers, or crayons
- Scissors
- Glue
- String

## Instructions:

1. Decorate your paper plate like outer space! This will be the backdrop for your star's life cycle.
2. Carefully use the scissors to cut your paper plate into a spiral. Ask an adult to help you if needed! Leave a small circle at the center of your spiraled plate.
3. At the top of your spiral, attach your string so you can hang your mobile when you're done! You can use glue or tape, or poke a hole through the plate and tie your string to attached it.
4. Select different objects to represent each stage in the life of your star. Pick any materials you like, or follow these suggestions:
  - a. Star-forming nebula: cotton balls or pillow stuffing
  - b. Protostar: small light-colored bead or sequin
  - c. Main Sequence Star (like our Sun): yellow bead or pom-pom
  - d. Red Giant: large red pom-pom or red paper circle
  - e. Planetary Nebula: small bead and cotton balls or pillow stuffing
  - f. White Dwarf: white bead or pom-pom
  - g. Black Dwarf: small black bead or pom-pom
5. Start by gluing your nebula materials at the very top of your spiral plate, around the string. Next, glue your black dwarf to the end. Evenly space out the rest of your representative objects and glue them to your spiral plate in the appropriate order.
6. Use the string to hang up your mobile! As it spins, follow along with the different life stages of a star just like our very own Sun!