

LIFE CYCLE OF STARS

All stars are born, mature, and eventually die. A star's mass is the most important factor that determines how it will live and die.

Stars are Born

Throughout the universe, **dense clouds of gas and dust** are the birthplaces of stars. Gravity pulls the gas and dust into clumps. If the clump is massive enough, a star forms—increased pressure and temperature cause its core to ignite, initiating nuclear fusion. Lower mass objects such as brown dwarfs, planets, and asteroids form along with stars.

Stars Live and Die

After billions of years of hydrostatic equilibrium, a star will run out of fuel in its core and begin to die. What happens next depends on the mass of the star.

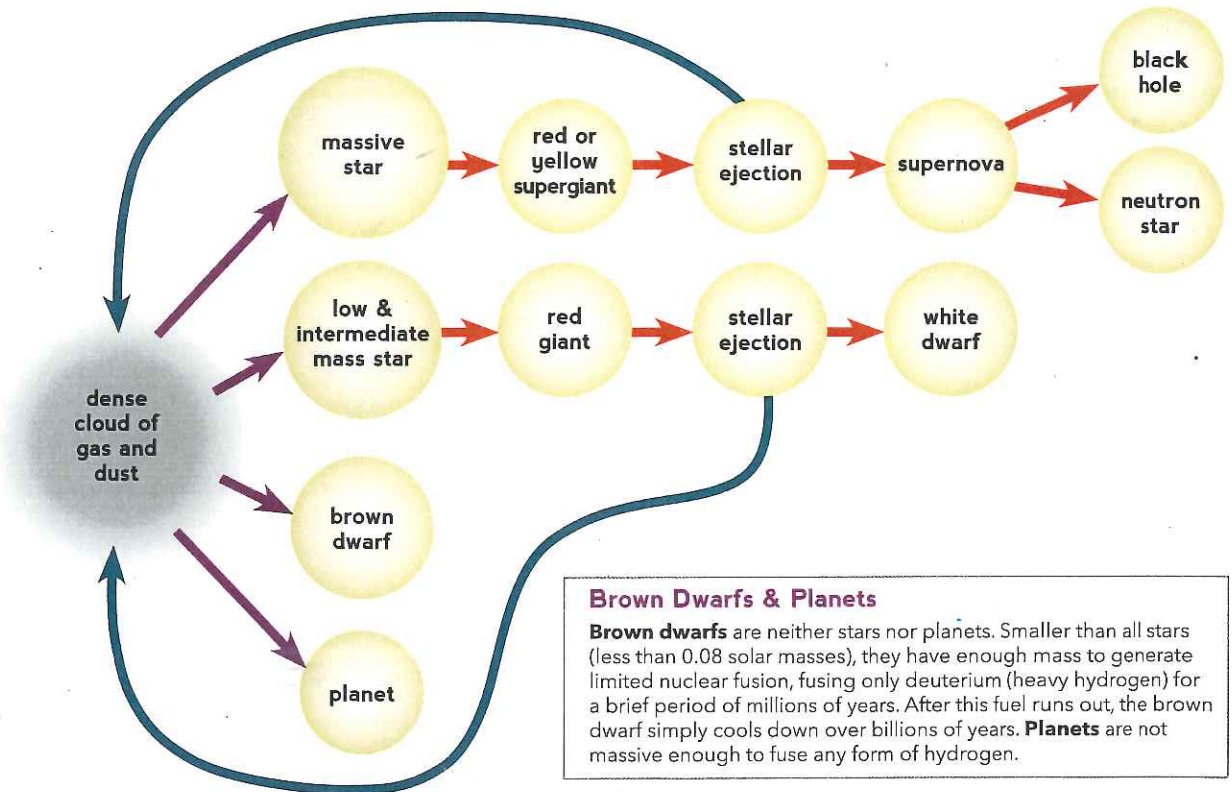
For **low and intermediate mass stars** (up to 8 solar masses), the outer layers swell into a **red giant**. The star then ejects its outer layers, while the interior collapses into a **white dwarf**. It takes billions of years for the white dwarf to cool down. Ninety-nine percent of stars end their lives like this.

A **high mass star** (between 8 and 20 solar masses) becomes a **red supergiant** and begins to shed stellar matter. The star collapses in on itself, causing it to explode as a **supernova**, ejecting even more matter. Its core becomes a **neutron star**, which takes millions of years to cool down.

The **most massive stars** (over 20 solar masses) form **red or yellow supergiants**, and then explode in **supernovas**, forming **black holes** in their centers. Black holes are so dense that not even light can escape their gravity.

The Cycle Continues

As a star dies, it **ejects matter** out into space that provides raw material for new stars, planets, and other celestial objects.



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