



## Stellar Evolution and the Fate of Earth

Guide for Curriculum Unit 05.04.01  
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Life on Earth would not have been possible if it were not for the process of star formation that has been continuously occurring since the Universe began to expand some 13-15 billion years ago. Each star evolves in a slightly different way depending on the initial mass of the star. Stars begin their life as a vast cloud of dust and gas (mostly hydrogen gas). Gravitational forces bring these particles and gases together until the conversion of gravitational potential energy to heat causes the temperature to raise enough to allow hydrogen fusion. Once hydrogen starts fusing into helium, a star is born. While all stars form in similar ways, the path a star takes to its eventual death is dependent on its initial mass. Low mass stars (about five times the mass of the Sun or less) will evolve and end their life as a white dwarf. Intermediate mass stars (five to ten times the mass of the Sun) will evolve and end their life as a neutron star while the most massive stars become black holes. Life on Earth is related to this process of star formation, and it is this process that will some day be the demise of the Earth and all life on it. Current measurements suggest that the Sun is halfway through its ten billion year life cycle.

In addition to addressing the concerns and questions that my eighth-grade students have about stars, how they form, how they die, and what that means for life here on Earth, this curriculum unit reflects the New Haven Public School scientific inquiry performance standards and New Haven's Earth Science performance standards. Using those standards as a guide, I will focus on, and develop the following topics related to stellar evolution for the classroom: 1) The sequence of events as stars form, "burn" their fuel, and then end their life, and 2) The fate of our Earth as our own sun progresses through its evolution.

(Recommended for Earth Science, grade 8.)

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