



Standards Covered in this Unit

Earth's Place in the Universe

1. Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time. As a basis for understanding this concept:
 - a. *Students know* how the differences and similarities among the sun, the terrestrial planets, and the gas planets may have been established during the formation of the solar system.
 - b. *Students know* the evidence from Earth and moon rocks indicates that the solar system was formed from a nebular cloud of dust and gas approximately 4.6 billion years ago.
 - c. *Students know* the evidence from geological studies of Earth and other planets suggest that the early Earth was very different from Earth today.
 - d. *Students know* the evidence indicating that the planets are much closer to Earth than the stars are.
 - e. *Students know* the Sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium.
 - f. *Students know* the evidence for the dramatic effects that asteroid impacts have had in shaping the surface of planets and their moons and in mass extinctions of life on Earth.
 - g. *Students know* the evidence for the existence of planets orbiting other stars.

2. Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time. As a basis for understanding this concept:
 - a. *Students know* the solar system is located in an outer edge of the disc-shaped Milky Way galaxy, which spans 100,000 light years.
 - b. *Students know* galaxies are made of billions of stars and comprise most of the visible mass of the universe.
 - c. *Students know* the evidence indicating that all elements with an atomic number greater than that of lithium have been formed by nuclear fusion in stars.
 - d. *Students know* that stars differ in their life cycles and that visual, radio, and X-ray telescopes may be used to collect data that reveal those differences.
 - e. *Students know* accelerators boost subatomic particles to energy levels that simulate conditions in the stars and in the early history of the universe before stars formed.
 - f. *Students know* the evidence indicating that the color, brightness, and evolution of a star are determined by a balance between gravitational collapse and nuclear fusion.
 - g. *Students know* how the red-shift from distant galaxies and the cosmic background radiation provide evidence for the "big bang" model that suggests that the universe has been expanding for 10 to 20 billion years.

The above standards will be covered by the Benchmark Tests given at the end of each unit. Students should use these standards as a study guide. General tutoring is available after school for all science classes; ask your teacher for details. Targeted tutoring will be available specifically for those students who do not pass the Benchmark Test. Details regarding targeted tutoring will be sent home as required.